BONNEVILLE POWER ADMINISTRATION

APRIL 1999

MID-COLUMBIA COHO REINTRODUCTION FEASIBILITY PROJECT

Final Environmental Assessment and
Finding of No Significant Impact
DOE/EA-1282

MID-COLUMBIA COHO SALMON REINTRODUCTION FEASIBILITY PROJECT

FINDING OF NO SIGNIFICANT IMPACT

APRIL 1999

DEPARTMENT OF ENERGY
Bonneville Power Administration

Mid-Columbia Coho Salmon Reintroduction Feasibility Project

Finding of No Significant Impact (FONSI)
and Floodplain Statement of Findings

Summary: Bonneville Power Administration (BPA) is proposing to fund research for 2 to 3 years on the feasibility of reintroducing coho salmon into mid-Columbia River basin tributaries. The research would take place in the Methow and Wenatchee river basins in Chelan and Okanogan Counties, Washington. BPA has prepared an Environmental Assessment (EA) (DOE/EA-1282) evaluating the proposed project. Based on the analysis in the EA, BPA has determined that the proposed action is not a major Federal action significantly affecting the quality of the human environment, within the meaning of the National Environmental Policy Act (NEPA) of 1969. Therefore, the preparation of an Environmental Impact Statement (EIS) is not required, and BPA is issuing this FONSI.

This FONSI includes a finding that there is no practicable alternative to locating a portion of the project within 100-year floodplains.

Copies: For copies of this FONSI or the EA, please call BPA's toll-free document request line: 800-622-4520.

For Further Information, Contact: Nancy Weintraub, KECN-4, Bonneville Power Administration, P.O. Box 3621, Portland, Oregon, 97208-3621. Her phone number is 503-230-5373; her fax number is 503-230-5699.

Supplementary Information: BPA proposes to fund coho research and broodstock development in the Wenatchee and Methow river basins for 2 to 3 years. BPA is responding to a need to determine the ecological risks and biological feasibility of reintroducing coho to mid-Columbia River basin tributaries, from which they have been extirpated for at least a half century. Reintroduction of coho into the mid-Columbia region has been identified by regional fish-managing entities as one of 15 high-priority projects for the Columbia River basin. The project is included in the Northwest Power Planning Council's (Council) Fish and Wildlife Program, and was recommended by the Council to BPA for funding in 1996. However, before a full-scale reintroduction program is implemented, feasibility research needs to be conducted. Besides BPA, project participants include co-managers Yakama Indian Nation (YIN) and Washington Department of Fish and Wildlife (WDFW); National Marine Fisheries Service (NMFS); U.S. Fish and Wildlife Service (USFWS); U.S. Forest Service (USFS); and Confederated Tribes of the Colville Indian Reservation.

Federal and State fish agencies and YIN, as well as environmental groups and individual citizens, have been strongly interested in the project. In the Wenatchee and Methow basins, there are several fish species listed under the Endangered Species Act (ESA), as well as several other game fish species, which are the subject of various enhancement programs. The primary concern

of most organizations and citizens has been the potential for reintroduced coho to prey on or compete with other weakened, sensitive, or prized species in the two basins. BPA has participated in extensive discussions leading to alternatives that BPA seriously considered and included in this EA/FONSI (see below). BPA has remained open to the views of the community and all project participants as well as those of the original project proponents (YIN). We realize this project, if fully implemented, could increase the risk of harm to other sensitive fish species in the basin. We believe, however, that in this first phase--the feasibility studies--the risks are low and that they are manageable through monitoring and annual review by project participants, with adjustments as necessary to minimize risks. This FONSI documents that the research can be conducted without significant environmental impacts.

Several possible alternative plans have been identified and are addressed in the EA (Chapter 2). Briefly, they are as follows:

- Tribal Alternative (Proposed Action): BPA would fund research into all life phases of coho and their interactions with other species in the Wenatchee and Methow basins, including survival, natural spawning, predation, residualism, and productivity studies; genetics monitoring; and a broodstock development program. Research would depend on acclimation and release of up to 1,000,000 coho smolts in the Wenatchee basin and up to 400,000 smolts in the Methow. Up to three of six alternative acclimation sites would be developed in the Wenatchee; up to three existing acclimation sites in the Methow would be used.

- Phased Study Alternative: BPA would fund research as described above, including coho releases and acclimation site development, in the Wenatchee basin only.

- Hatchery Releases Alternative: BPA would fund research, including coho releases, designed to answer one key question: can adult coho return to the mid-Columbia in sufficient numbers to replace themselves? Coho would be acclimated and released only at existing hatcheries in the Wenatchee basin; acclimation in natural habitats would not take place. Studies of coho predation and ability to naturally reproduce would not be done.

- No-Action Alternative: Continue coho releases of 700,000 smolts/yearlings/etc. as is done currently under the Management Agreement for 1997 Brood Upper Columbia River Coho, a stipulated order under *United States v. Oregon*. There would be no BPA funding or participation and no in-basin acclimation. Release numbers and locations would be agreed to annually by parties to the order. Little, if any, research would be done.

Table 4 in the EA summarizes the impacts of each alternative. The impacts of two of the three action alternatives (Tribal and Phased Study) are similar in nature and intensity; the primary difference between the two is that the geographic scope is reduced in the Phased Study alternative. The impacts of the third action alternative (Hatchery Releases) overall are lower in intensity than the other two. BPA has determined, based on the context and intensity of these impacts, that they are not significant, using the definition of this concept in section 1508.27 of the Council on Environmental Quality Regulations for implementing the National Environmental Policy Act. This determination is based on the following discussion of each point listed in section 1508.27:

1. The project aims to develop knowledge about how a largely domesticated stock might be reintroduced and naturalized in a basin where it has long been absent. This knowledge may be applicable throughout the Columbia basin. When combined with other current and future research on similar issues, the cumulative benefit of the mid-Columbia project would be to increase the chances that other reintroduction projects would succeed, and that the concomitant resource risks would be reduced. These activities would serve to answer critical uncertainties associated with future reintroduction activities. While the benefits of the proposed research warrant BPA funding, the results from this 2- to 3-year project alone would not significantly increase the potential for success of reintroduction projects in the region.

2. Implementation of the Tribal, Phased Study, or Hatchery Releases alternatives would not affect the health and safety of the people of the Wenatchee or Methow basins. As documented in section 3.4.1.2 and 3.4.2 of the EA, water and chemical use and wastewater discharges would be within permitted amounts. Water temperatures of local rivers would not be increased because amounts used for acclimation sites (Tribal and Phased Study alternatives) would be small, in most cases water would be part of natural or existing ponds, and use would occur in early spring when water is cold and flows are high (section 3.4.1.3). Screw traps are an obstacle to recreational boaters such as rafters, kayakers, and others. However, traps would be located away from high-use areas for recreational boaters and would be flagged to warn boaters of their presence. These issues are not significant in the context of NEPA because the risks are small relative to other factors affecting health and safety in the local area.

3. Research activities for all alternatives would take place in environmentally sensitive areas. However, because acclimation sites are already developed in the Methow basin (Tribal alternative), and because only one of six alternative sites in the Wenatchee basin requires construction-type activity to develop (Tribal and Phased Study), most sensitive areas would not be affected. Specifically:

    a. In the Wenatchee basin, Icicle Creek near one proposed acclimation site, and White River near another, have been recommended by the Wenatchee National Forest for inclusion in the National Wild and Scenic Rivers System as Recreational Rivers. Installation of a temporary smolt screen at Icicle Creek, and installation of a temporary net and smolt exit pipe in a beaver dam at White River Side Channels, would not adversely affect the recreational and other values of the rivers (EA, section 3.4.1.3).

    b. Although proposed acclimation sites are located in ecologically critical areas such as wetlands, floodplains, and State Shoreline areas, development of only one alternative site in the Wenatchee basin (Two Rivers) would adversely affect those areas. A wetland, a 100-year floodplain, and a State Shoreline area could be affected if that site is developed (Tribal and Phased Study alternatives). Acclimation ponds for the site would be dug on the property of an operating sand and gravel quarry in an already disturbed area. The smolt exit channel, however, would disturb or destroy riparian and/or wetland vegetation for a distance of about 80 meters (260 feet). Plant surveys would be completed before ponds and channels are designed and constructed to determine if any sensitive species

occupy the area. If any sensitive species are found, the areas would be avoided or the site would not be developed. To avoid impacts on wetlands, information from wetlands delineation surveys would be used during final design to develop mitigation measures, if necessary, to ensure that the project would result in no net loss of wetlands. Buffers from construction activities would be provided. Upon completion of construction, disturbed land would be restored to its previous condition wherever possible (EA, section 3.4.1.3). Therefore, impacts on wetlands, floodplains, and State Shorelines would not be significant.

The actions proposed would not affect prime farmland or park lands, as there are none present in the vicinity.

4. The impacts of actions proposed under the three action alternatives are not significant due to their controversy. Controversy that surfaced during development and review of the draft EA centered on the number and locations of coho smolt releases and the consequent level of risk to endangered spring chinook populations in the Wenatchee basin, as originally proposed under the Tribal alternative. BPA and project participants subsequently developed release numbers and sites for 1999 that parties agree pose minimal risk to spring chinook, and they are committed to reaching agreement on future release numbers and sites to maintain minimal risk for the research period.

5. The impacts of actions proposed under the three action alternatives are not significant due to the degree of highly uncertain, unique, or unknown risks. These issues were raised by project participants and members of the public, particularly in regard to the risks of predation by coho smolts on spring chinook. Concerns were that not enough research has been completed to date to confirm that releases of coho smolts in or near spring chinook habitat would not pose a significant predation risk. While one year of study has been completed in the Yakima Basin that did not show significant predation of coho smolts on spring chinook, several project participants believe that additional studies are needed. In order to address this issue, proposed smolt release numbers in Nason Creek, the primary spring chinook habitat, were reduced for 1999, and an additional year of study is planned in the Yakima basin. The fish managers (YIN and WDFW) have agreed that they will annually review the results of the previous year's research and come to agreement on release numbers and locations for the subsequent years based on the results of the ongoing research. The Biological Opinion from the National Marine Fisheries Service supports the conclusion that, with monitoring and risk containment measures (EA, section 3.3.1.2), the risk to spring chinook would not jeopardize their continued existence.

6. The actions proposed would not establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration. Contrary to the assertions of some, this project does not constitute a decision to reintroduce coho to mid-Columbia tributaries. BPA is unwilling to commit substantial resources to such an effort without some indication of its potential for success, as reintroduction of an extirpated fish species is not a well-researched action. If research shows that the potential exists for full-scale reintroduction to be successful, and that impacts to other sensitive species can be minimized to acceptable levels, then, under NEPA, the time would be "ripe" to assess the effects of such a program.

7. The proposal is not connected (40 C.F.R. 1508.25 (a)(1)) to other actions with potentially significant impacts, nor is it related to other proposed actions with cumulatively significant impacts (40 C.F.R. 1508.25 (a)(2)). Section 3.6 of the EA addresses the cumulative fishery resource impacts. Although the proposed action is related to actions being addressed under the *Impacts of Artificial Salmon and Steelhead Production Strategies in the Columbia River Basin Draft Environmental Impact Statement* (Draft EIS), it is not precluded by 40 C.F.R. 1506.1 or 10 C.F.R. 1021.211 because it is not a major Federal action and would not significantly affect the quality of the human environment. The actions proposed are independent of the actions proposed under the Draft EIS and would not prejudice the ultimate decision on the program, as they are low-tech, minimal-impact actions to be taken for research purposes to answer specific questions regarding the potential impacts of and viability of an artificial coho production program in the mid-Columbia. Additional environmental review would be completed prior to the initiation of any long-term, full-scale production program.

8. There are no sites listed on or eligible for the National Register of Historic Places at or near any facility location. Only one of the six potential acclimation sites in the Wenatchee basin (Tribal and Phased Study alternatives) could require ground disturbance (EA, section 3.4.1.3). If developed, its final location would be surveyed before construction to insure that it would not adversely affect cultural resources, including tribal traditional-use areas.

9. Several fish, wildlife, and plant species in the Wenatchee and Methow basins are listed or proposed for listing under the Endangered Species Act. Of those discussed in the EA in Chapter 3, the following could be affected:

    a. Upper Columbia River spring-run chinook, listed as Endangered, spawn and rear in habitat near proposed coho release sites in the Wenatchee and Methow basins. However, little impact to spring chinook is expected because most coho acclimation/release sites are downstream of the primary spawning and summer rearing areas; once released, coho tend to migrate downstream rapidly; most returning adult coho spawners will home to their points of release, which are downstream of the spring chinook spawning/rearing reaches; and most adult coho would be collected to develop the localized broodstock, so few would be spawning in the wild. In addition, as discussed in #4 and #5 above and in section 3.3.1.2 of the EA, risk of impact to spring chinook would be further minimized by working with other fish managers to determine coho release sites and numbers that minimize risk; by releasing coho smolts in low densities; by releasing fish that more closely resemble sizes of wild coho, which tend to be smaller than hatchery fish; and by waiting until smolts are ready to actively migrate before releasing them.

b. Bull trout are listed as Threatened. There could be minor, temporary disturbances to bull trout migratory corridor habitat during construction of the Two Rivers acclimation site smolt exit channel, but erosion and sedimentation control best-management practices would ensure impacts were not significant. Migratory adult bull trout could be taken during rotary screw trap sampling, beach seining, electro-fishing, and adult coho broodstock collection. To minimize impacts, rotary traps would be attended 24 hours a day and checked every hour to remove fish and debris from the livebox. Bull trout found in the livebox would be released immediately. Bull trout captured by other collection methods also would be released immediately. To reduce potential mortality from electro-fishing, only personnel trained in the technique would be employed. They would follow guidelines for such procedures recently established by NMFS (NMFS 1998) (EA, section 3.5.1; Biological Assessment [BA], section 5.10). Therefore, impacts to bull trout would not be significant.

c. The grizzly bear is listed as Threatened. To access the White River Side Channel acclimation site (Tribal and Phased Study alternatives), the Sears Creek Road would be plowed in late March. This area has been identified as potential spring emergence grizzly habitat, although no use occurs at present. The project would install a locked gate at the point where plowing would begin to control the amount of disturbance from use of the road. All the acclimation sites are in areas with at least moderate human disturbance. There would be no disturbance to grizzly bear habitat from the project (EA, section 3.4.1.3; BA, section 5.4). Therefore, there would be no significant effects to grizzly bears from this project.

d. Two plants—Ute's Ladies Tresses (Threatened) and Wenatchee (Oregon) checkermallow (Proposed, Wenatchee basin only)—could be at or near the Two Rivers acclimation site (Tribal and Phased Study alternatives). If the site were developed, it would be surveyed before ground-disturbing activity begins. If plants are found, they would be avoided or the site would not be developed, so these two plants would not be adversely affected (EA, section 3.4.1.3).

Other listed and proposed fish and wildlife species in the two basins would not be adversely affected (EA, Chapter 3).

10. The actions proposed would not threaten to violate Federal, State, or local law or requirements imposed for the protection of the environment. The following permits and consultation *may* be required and will be obtained, as needed: Section 7 consultation and incidental take permit for trapping and electroshocking activities proposed in 2000 and 2001 (NMFS and USFWS), shoreline development permit (Chelan County), hydraulic project approval permit (WDFW), State water quality certification (Washington Department of Ecology), modifications to National Pollutant Discharge Elimination System permits, land-use permits (USFS), Clean Water Act Section 404 permit (U.S. Army Corps of Engineers), and use permits for nets across highway culverts (Washington Department of Transportation). Final determinations regarding the need for permits will be made after project participants decide on the final course of action.

***Floodplain Statement of Findings**:* This is a Floodplain Statement of Findings prepared in accordance with 10 C.F.R. Part 1022. A Notice of Floodplain and Wetlands Involvement was published in the Federal Register on November 9, 1998, and impacts to floodplains and wetlands were assessed in the EA (section 3.4.1.3). At one alternative acclimation site (Two Rivers), BPA would dig a smolt exit channel from the new ponds to the Little Wenatchee River, within the 100-year floodplain. The channel needs to pass through the floodplain in order to allow smolts access to the river. There are no alternatives that would avoid constructing the smolt exit channel in the floodplain at the Two Rivers site; however, there are alternative acclimation sites identified in the EA that would not affect floodplains. The actions proposed would conform to applicable State and local floodplain protection standards; a county floodplain development permit would be obtained, if needed, for work in the floodplain of the Little Wenatchee River.

The steps to be taken to avoid or minimize potential harm to or within the affected floodplain and wetlands include:

- In floodplain and shoreline areas, disturbed land would be restored as closely as possible to pre-project contours and replanted with native and local species. However, site topography could require bank disruption. A restoration and monitoring plan would be prepared before disturbing floodplain and shoreline areas.

- Erosion control measures would be implemented within the 60-meter (200-foot) State Shoreline area.

- Location of new structures within the identified shoreline and floodplain would be avoided.

BPA will endeavor to allow 15 days of public review after publication of this statement of findings before implementing the selected alternative.

Determination: Based on the information in the EA, as summarized here, BPA determines that the actions proposed, as described and analyzed in either the Tribal, Phased Study, or Hatchery Releases alternatives, are not major Federal actions significantly affecting the quality of the human environment within the meaning of NEPA, 42 U.S.C. 4321 et seq. Therefore, an EIS will not be prepared, and BPA is issuing this FONSI.

Issued in Portland, Oregon, on April 28, 1999.

/s/ James R. Meyer
James R. Meyer
Acting Vice President
Environment, Fish and Wildlife Group

MID-COLUMBIA COHO SALMON REINTRODUCTION FEASIBILITY PROJECT

FINAL ENVIRONMENTAL ASSESSMENT

DOE/EA-1282	Bonneville Power Administration
	In cooperation with:
April 1999	Yakama Indian Nation, Washington Department of Fish & Wildlife

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Chapter 1 Purpose of and Need for Action[1]

1.1 Underlying Need for Action

Before the Bonneville Power Administration (BPA) decides whether to fund a program to reintroduce coho salmon to mid-Columbia River basin tributaries, research is needed to determine the ecological risks and biological feasibility of such an effort.

Since the early 1900s, the native stock of coho has been decimated in the tributaries of the middle reach of the Columbia River (the Wenatchee and Methow rivers) (Mullan 1983), despite some unsuccessful efforts at reintroduction in recent decades. Since the 1990s, various entities in the Pacific Northwest have renewed the region's focus on reintroduction of coho to the mid-Columbia. The ~~four~~ five Columbia River Treaty Tribes (Nez Perce, Shoshone-Bannock, Umatilla, Warm Springs, and Yakama) identified coho reintroduction in the mid-Columbia as a priority in the *Wy-Kan-Ush-Mi-Wa-Kish-Wit* document, commonly referred to as the Tribal Restoration Plan (TRP) (CRITFC 1995). It is a comprehensive plan put forward by the Tribes to restore the Columbia River fisheries. In 1996, the Northwest Power Planning Council (NPPC) recommended the tribal mid-Columbia reintroduction project for funding by BPA, which has responsibilities under the Northwest Electric Power Planning and Conservation Act of 1980 to protect, mitigate, and enhance fish and wildlife that have been affected by the construction and operation of the Federal Columbia River Power System. It was identified as one of fifteen high-priority projects for the Columbia River basin, and was incorporated into the NPPC's Fish and Wildlife Program (program measures 7.1H, 7.4A, 7.4F, and 7.4O). The release of coho from lower Columbia hatcheries into mid-Columbia tributaries is also recognized in the Columbia River Fish Management Plan, a court-mandated plan under the jurisdiction of *U.S. v. Oregon*, involving Federal, state and tribal fish managers in the Columbia basin (CTWSR et al. 1988).

Because earlier reintroduction efforts have failed, research is needed to determine whether the regionally defined priority to reintroduce coho to the mid-Columbia has the potential to succeed without posing unacceptable ecological risks.

1.2 Purposes

In meeting the underlying need, the project participants (see section 1.3) want to achieve the purposes, or goals, listed below.

- Increase knowledge about coho and their interactions with the environment to sufficient detail to make an informed decision regarding the feasibility of reintroducing coho to the mid-Columbia tributaries.
- Protect species of fish listed or proposed for listing under the Endangered Species Act (ESA) in the mid-Columbia tributaries.

[1] Additions to the EA since the preliminary public review copy are shown as underlined. Deletions are not shown.

- Achieve cost and administrative efficiency in BPA fish mitigation efforts.
- Comply with all applicable laws, regulations, and Executive Orders.

1.3 Project Participants

- Yakama Indian Nation (YIN) (co-manager)
- Washington State Department of Fish and Wildlife (WDFW) (co-manager)
- United States Fish & Wildlife Service (USFWS)
- United States Forest Service (USFS)
- National Marine Fisheries Service (NMFS)
- Confederated Tribes of the Colville Indian Reservation
- Bonneville Power Administration

1.4 Decisions to be Made

Background: Since 1996, coho research has been ongoing in the mid-Columbia region, including the Yakima basin[2] (Figure 1). Results of this recent research are documented in *Results From YKFP and Mid-Columbia Coho Monitoring and Evaluation Studies* (Dunnigan and Hubble 1998). Study plans for 1999 research in the Yakima, Wenatchee and Methow basins are detailed in *Mid-Columbia Coho Salmon Study Plan* (YIN 1998). Results of coho research in the Yakima basin will contribute to decisions about the mid-Columbia program in the Wenatchee and Methow basins.

The coho program for the Yakima basin is part of the overall Yakima/Klickitat Fisheries Project (YKFP). Impacts of some of the earlier research activities for coho were assessed in the Yakima Fisheries Project Final EIS (USDOE-BPA 1996). Additional activities under that program will be addressed in a supplemental analysis tiered to the EIS.

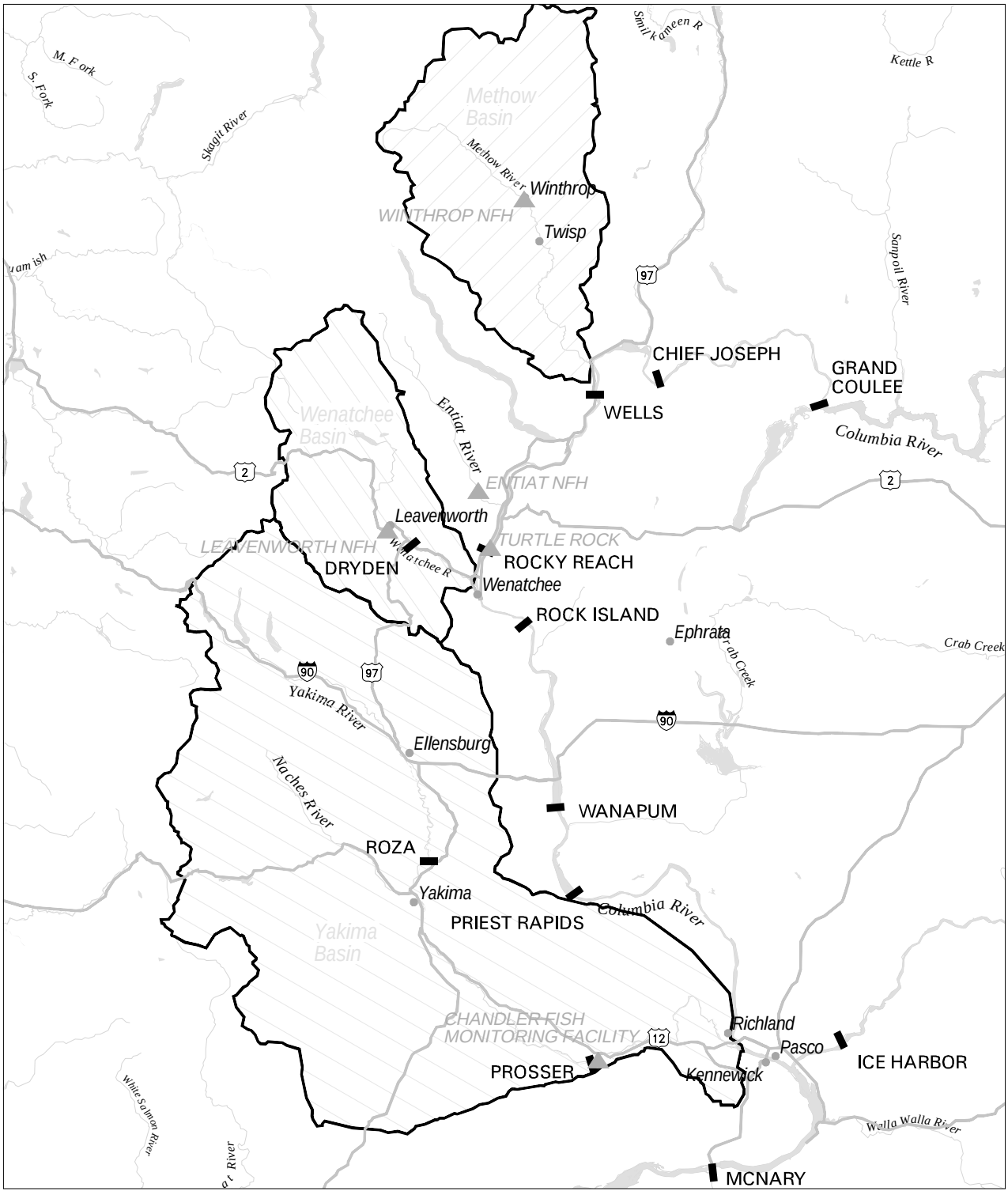
The coho program for the mid-Columbia tributaries (Wenatchee, Methow, Entiat) was initiated with a combination of Mitchell Act, BPA, and YIN funds. The work funded by BPA to date was categorically excluded under the National Environmental Policy Act (NEPA).

1.4.1 Decisions Based on This Environmental Assessment

BPA Decision: BPA must decide whether to fund the Mid-Columbia Coho Reintroduction Feasibility Project. It is Phase 1 of a two-phase project that will attempt to reintroduce coho salmon to the Wenatchee and Methow river basins. The first phase is experimental in nature and is designed to begin resolution of several critical uncertainties related to the reintroduction of coho into tributaries of the mid-Columbia. Phase 2 would move to a full-scale reintroduction

[2] A 1992 study was implemented prior to initiation of the BPA contracts and was funded for only one year by another source.

FIGURE 1 MID- COLUMBIA COHO SALMON STUDY - LOCATION MAP



project if the results of Phase 1 demonstrate that it is feasible and that any environmental risks are acceptable.

The subject of this Environmental Assessment (EA) is the Phase 1 work. As required under NEPA procedures, BPA must examine the environmental effects of the project and determine whether they are significant. If they are determined not to be significant, a Finding of No Significant Impact (FONSI) will be issued and Phase 1 work may proceed. If they are determined to be significant, an Environmental Impact Statement (EIS) must be prepared before making a decision to proceed.

Because the Phase 2 work will not be ripe for decision for a period of time while we gather information on the feasibility of proceeding, we will address Phase 2 in a separate NEPA document at the appropriate time (see section 1.4.2).

NMFS/USFWS Decision: NMFS and USFWS will use the EA, the Biological Assessment (BPA 1999), the *Mid-Columbia Coho Salmon Study Plan* (YIN 1998), and coho research results (Dunnigan and Hubble 1998) to provide a Biological Opinion on effects to endangered species, as required under the Endangered Species Act.

USFS Decision: The USFS will use the EA along with its own management, planning and NEPA documents to inform decisions regarding use permits for activities proposed on USFS land.

1.4.2 Future Decisions

At some point in the future, decisions will need to be made whether to pursue further studies, to abandon efforts to reintroduce coho to mid-Columbia basins, or to begin full-scale implementation of reintroduction efforts. These decisions, if they involve participation by Federal agencies, probably would be subject to further environmental review and would include a range of alternative approaches. The results of the Phase 1 studies discussed in this EA would contribute to those decisions, but the importance placed on the results of any particular aspect cannot be predicted at this time. That would depend on the study program selected and on the study results themselves.

In addition, the NPPC has established a three-step review process for production programs in the Fish and Wildlife Program, of which the Mid-Columbia Coho Reintroduction Project is a part. Each project is reviewed at key stages of development—conceptual planning, preliminary design, and final design. Projects that propose new production, including those that begin planting fish in waters they have not been planted in before and/or that increase significantly the number of fish being introduced, are subject to this review. Phase 1 of the Mid-Columbia Coho Reintroduction Project was initiated before this process was established and is considered experimental, so no review as part of the three-step process is required at this stage. Before initiation of Phase 2 of the coho project within a specific mid-Columbia basin, a three-step review would be conducted. It will include the information collected and evaluated in Phase 1 and a review by an independent peer review panel. Currently, it is anticipated that the three-step review would be initiated in September 2000 and would take about a year to complete.

1.5 Scoping Issues

During scoping for this EA (December 1-30, 1998), BPA received comments from 13 citizens and representatives of tribes and government agencies. This section describes the issues raised and where in the EA they are addressed.

- An alternative was suggested that broodstock development and research be continued in the Yakima basin to determine if it is viable there before moving into the Wenatchee and Methow. **Response:** Some reintroduction issues are basin-specific and cannot be addressed effectively in a different basin. However, an alternative of doing research in the Wenatchee basin only was included. See section 2.3.
- An alternative of hatchery releases only (instead of releases from acclimation sites closer to spawning areas in the tributaries) was proposed to first determine if coho survival can be achieved. **Response:** This alternative was included. See section 2.4.
- What are project costs? **Response:** See descriptions for each alternative in chapter 2.
- Concerns were expressed about whether costs of the project in dollars and to farmers and ranchers justify the benefits, especially if fish are taken downstream or if expected survival rates are low. **Response:** The costs of alternatives are shown under the description of each alternative in chapter 2. Alternatives, including No Action, are compared in section 2.5. Coho harvest currently is limited (section 3.2.1). There would be few, if any, impacts to farmers and ranchers (see sections 3.3, 3.4 and chapter 4). One purpose of the research proposed is to determine what survival rates are (chapter 2). It is one of the pieces of information researchers would need before moving to full-scale reintroduction in Phase 2.
- What were the reasons for salmon extinction in these areas in the early 1900s? **Response:** See section 3.2.1.
- Concerns were raised about the wisdom of undertaking the project in light of impacts to juvenile chinook and steelhead including predation on other species, competition among species for scarce resources, transfer of disease to wild fish, the introduction of alien fish to a natural system, and the ability of the stocks of coho currently being used to travel the long distances from the ocean back to the mid-Columbia. **Response:** These impacts are discussed in section 3.3.
- A concern was raised that proposed monitoring facilities and activities would be expensive and degrade the habitat similar to facilities and activities implemented for spring chinook supplementation in the Methow basin. **Response:** In general, while some activities listed are similar (trapping, analyzing fish, radio tracking), facilities and activities proposed for this project appear to be more limited than those described by the commenter for spring chinook (no concrete facilities, no weirs). See sections 2.2, 3.4, 3.5.
- The EA needs to include the effects of development of acclimation ponds, including effects in wetlands and the need for Section 404 permits under the Clean Water Act. **Response:** See section 3.4.1.3.

- The EA needs to include effects on endangered species and their current status. **Response:** See various sections in chapters 3 and 4.
- The EA needs to include effects on cultural and historical resources. **Response:** See various sections in chapters 3 and 4.
- Questions were raised about the statistical power of recent coho studies**. Response:** These studies are described in detail in Appendix A of the *Mid-Columbia Coho Salmon Study Plan* (YIN 1998. See References section). Study results and researchers' confidence in the analyses are summarized in section 3.3.1.2.
- One commenter was concerned about impacts on water rights for hard-pressed farmers and ranchers. **Response:** Water rights and use of water for irrigators are not expected to be compromised (section 3.4).
- One commenter supported coho reintroduction unless it placed unwanted restrictions on use of property by riverfront property owners. **Response:** The research proposed for this project would not restrict riverfront property owners in any way.
- How would the coho be protected from downstream harvesters and bird and mammal predation? **Response:** Coho harvest currently is limited (see section 3.2.1); bird and mammal predation is part of the natural environment.
- A concern was raised that if the coho were restored to the point of being listed as endangered, then the ability of the Okanogan County Department of Public Works to do road, bridge and culvert maintenance would be adversely affected. **Response:** This is unlikely to happen because the stock being reintroduced was never an original stock, so it would not be considered under the Endangered Species Act. In addition, any current constraints the department currently is under due to other listed stocks would adequately protect coho.

Chapter 2 Proposed Action and Alternatives

2.1 No Action Alternative

If BPA does not fund studies as described in sections 2.2 – 2.4, the current situation could be expected to continue. Coho salmon currently are released in the mid-Columbia region as specified in the Management Agreement for 1997 Brood Upper Columbia River Coho (The State of Washington, et al.), a stipulated order in *United States v. Oregon*. Releases would continue as described in that plan. In 1999, up to 2.1 million coho would be raised at lower Columbia River hatcheries, trucked to mid-Columbia basins (including Yakima), and released, either as smolts or as sub-yearlings. Specific numbers and release basins are negotiated annually. As of the writing of this EA, 1,000,000 smolts were targeted for Yakima basin sites. The remaining 700,000 smolts could be available for other basins in the mid-Columbia, including the Wenatchee and Methow. These releases would be subject to consultation with NMFS and USFWS on their effects on listed fish species. Recently coho have been released in the Methow, Yakima, and

Klickitat basins. Fish would not be acclimated in the natural environment. No research would be conducted in connection with these releases, although fish would be marked for purposes of estimating adult returns.

2.2 Tribal Alternative (Proposed Action)

The Tribal Alternative proposes research beginning in 1999, and lasting at least 2-3 years, that will allow decision-makers to determine if a locally adapted stock of coho salmon can be developed that will be able to repopulate the Wenatchee and Methow basins. The YIN's approach to coho salmon reintroduction is based upon the Tribal Restoration Plan (TRP) (CRITFC 1995). The YIN supports a "gravel-to-gravel" management approach to salmon mitigation throughout the Columbia River basin. This means managing the biological needs of the fish from egg deposition to spawning adult. Ideally the YIN desires to establish viable salmonid populations supported entirely by the natural environment.

To determine whether restoration of natural spawning is feasible, the YIN proposes to evaluate all stages of mid-Columbia coho life history.

- **Monitoring of reproductive success or egg viability** helps to determine if a highly "domesticated" hatchery stock—the only stock reasonably available now that local stocks have been extirpated—can be "naturalized" to produce viable offspring in the natural environment.
- **Juvenile freshwater monitoring** helps to determine 1) if healthy condition factors[3] from rearing in the natural environment are possible from a hatchery origin stock, and 2) if interactions with other species of concern (competition/predation) are within allowable limits.
- **Calculating smolt-to-smolt survival rates** helps to assess habitat problems during migration from freshwater rearing habitat to the ocean.
- **Smolt-to-adult survival rates** are the basic measure of program success and feasibility. Can adults return to the mid-Columbia basins in sufficient numbers to reestablish a naturally spawning, locally adapted coho stock?
- **Spawning surveys** determine whether the coho successfully spawn, at the optimal time, in preferred habitat areas.

Research proposed in the Wenatchee and Methow river basins builds on previous and continuing work in the Yakima basin (section 1.4) and is divided into categories that address four types of issues: Natural Production, Ecological Interactions, Long-Term Fitness, and Culturing/Genetics.

[3] Standardized length-weight conversion tables for several species of fish including coho were developed several years ago as a general measure of fish health. These tables are based on what is termed in fish culture as "condition factor," which is expressed as the ratio of fish weight (in grams) to length (in millimeters) cubed. A well-fed fish will have a higher ratio than a poorly fed fish of the same length and should therefore be in better condition.

The studies listed below would be conducted in both the Wenatchee and Methow basins, with two exceptions. Direct predation studies will be conducted only in the Wenatchee basin, and the culturing/genetics program is not basin-specific. This alternative does not propose to study all potential ecological interactions between coho and other species. The Technical Work Group agreed that results of some studies being conducted in the Yakima basin would be applicable in other basins as well. Study designs for the research described below, as well as for studies in the Yakima basin, are explained in detail in the *Mid-Columbia Coho Salmon Study Plan* (YIN 1998).

Natural Production

- Smolt-to-smolt and smolt-to-adult survival studies

  What are the **smolt-to-smolt** and **smolt-to-adult** survival rates for hatchery coho released in the Wenatchee and Methow basins? These questions would be answered in two ways. To estimate smolt-to-smolt survival to McNary Dam and other lower Columbia River mainstem projects, a portion of each release group (approximately 7,000 fish annually in the Wenatchee, 8,000 in the Methow) would be PIT-tagged (section 3.5.1, Tracking Methods). Smolt-to-adult survival would be monitored based on Rock Island minus Rocky Reach and/or Tumwater Dam adult fish passage counts for the Wenatchee basin, and based on Wells Dam counts for the Methow basin.

- Redd surveys

  These studies would help determine where and how many adults return to spawn with respect to the juvenile release sites. A key feasibility issue is whether or not coho are in fact spawning in proportion to the number of adults counted past an in-basin monitoring site, and if coho adults are spawning in areas considered suitable for coho.

  Returning adults would be radio-tagged at various dams to determine where they go within each basin (section 3.5.1, Tracking Methods). Foot/boat **redd** surveys would be conducted in the Wenatchee basin when sufficient numbers of spawners (i.e., 100 fish) return over Rock Island or Tumwater dams for the Wenatchee basin, and over Wells Dam for the Methow basin. Surveys would be conducted initially in stream reaches close to the smolt release sites, and would branch out from these release sites if the appropriate numbers of redds are not located. Physical data would be recorded from a random sample of redds in each sub-basin. If researchers encounter difficulty locating coho redds near release locations in 2000, up to 100 adults could be radio-tagged in 2001 to determine spawning distribution.

Ecological Interactions

- Direct predation studies

  A rotary trap would be placed near no more than three coho acclimation/release sites in the Wenatchee basin to monitor the level of predation on spring chinook and sockeye fry by coho smolts. The stomach contents of up to 3,000 coho would be examined for each of two studies (one of coho predation on spring chinook, the other of coho predation on sockeye) (6,000 fish total). Predation studies would not be done in the Methow basin primarily because the opportunities don't exist to study predation on the species of concern—spring chinook, sockeye, and steelhead. All returning spring chinook adults in the Methow are

collected and taken to the hatchery to be bred under an adult-based supplementation program (see section 3.2.3). Steelhead spawn farther upstream and emerge after coho have migrated (section 3.3.1.2).

- Residualism surveys

  Snorkeling surveys would be done to determine whether and how many coho do not migrate downstream after release.

Long-Term Fitness

- Coho productivity studies

  This study would be an analytical exercise. Stock productivity would be expressed as the number of returning hatchery adults (F_2) resulting from the initial number of adults (including jacks) spawned for a specific broodyear (F_1). The number of returning hatchery adults would be estimated based on the mainstem Columbia River counts between Rock Island and Rocky Reach dams, and Tumwater Dam and/or the Chiwawa adult weir for the Wenatchee basin; and on Wells Dam counts for the Methow.

Culturing/Genetics

- Egg banking/broodstock program

  Researchers hypothesize that reintroducing coho to the mid-Columbia depends on whether a viable coho broodstock program can be established to provide eggs/smolts for off-hatchery acclimation/releases in the Methow and Wenatchee basins. To address this question, adult broodstock would be collected at Priest Rapids, Rocky Reach and/or Wells dams on the Columbia River, potentially at tributary sites such as Tumwater and Dryden dams and Chiwawa weir in the Wenatchee, and from adults returning to any of the mid-Columbia hatcheries as strays. All egg-to-pre-smolt rearing would occur at an existing hatchery in the mid-Columbia region. Smolts would be **acclimated** under natural conditions at off-hatchery acclimation ponds in the Wenatchee and Methow basins.

- Genetics monitoring

  The genetics monitoring program would study:

  - the naturalization of a domesticated fish stock (Lower Columbia River stock);
  - allelic frequencies to determine the amount and rate of divergence of the mid-Columbia broodstock from the lower river stock;
  - physical traits and demographic information for introduced coho juveniles and adults and the contribution of those traits and other characteristics to survival; and
  - changes in rates of straying and colonization.

  Details of the genetics monitoring study are described in the Study Plan (YIN 1998).

The proposed actions would take place on the following schedule:

Spring 1999: Release coho smolts from two acclimation sites, Swamp site on lower Nason Creek (75,000) and Leavenworth Hatchery (450,000) in the Wenatchee basin. No fish would be released in the Methow basin in 1999.

Collect coho smolts at the WDFW screw trap site on the Wenatchee River just downstream of the confluence with Nason Creek and analyze for predation. (Trap is sited to maximize collection of sockeye and would only incidentally collect coho, so this would not be a full-fledged predation study.)

Possibly radio-tag and track into the Methow any adults returning to Wells Dam for spatial/temporal spawning information.

Summer 1999: Possibly obtain permits for and develop the Two Rivers acclimation site in the Wenatchee basin (a maximum of three acclimation sites would be needed for the year 2000 out of the six sites evaluated in this EA).

Continue interaction studies.

Spring 2000 and 2001: Release up to 1,000,000 coho smolts from up to three acclimation sites and conduct predation studies at 2-3 sites in the Wenatchee basin. Possibly, release up to 400,000 smolts from Winthrop Hatchery in the Methow basin for survival studies.

Summer 2000 and 2001: Continue interaction studies.

Fall 2000 and 2001: Collect broodstock and continue radio-tagging studies and redd counts as warranted.

Actions proposed for 2000 and 2001 are not yet firm; this EA evaluates the widest potential scope of the research. The technical team will evaluate the results obtained from the 1999 studies before deciding on the scope of the 2000 and 2001 work. All project participants must agree to actions in both 1999 and beyond before they are implemented.

Table 1 shows the kinds of actions required to undertake the proposed research program. Activities and numbers represent the maximum level of effort that might be reached at some point in the 2 – 3-year research period, depending on agreements among the project participants. Figures 2 and 3 show general locations in the Wenatchee and Methow basins. Program costs would be approximately $2.1 million over the 2-year period of 1999-2000.

Table 1 Activities Required for Tribal Alternative

Activity	Wenatchee	Methow	Purpose
Volitional smolt releases	Up to 1,000,000 (Apr 25–May 30)	Up to 400,000 (Apr 25-May 30)	All categories (section 2.2)
Acclimation sites	- Nason Creek (at Swamp and Butcher creeks) - Little Wenatchee and White Rivers (White River Side Channels and Two Rivers) - Icicle Creek (Hatchery Side Channel or Pond) - ~~Wenatchee River (Chiwaukum Creek)~~Beaver Creek Use a maximum of 3 of the 6 sites	- Chewuch River (Eightmile Creek Ponds) – existing - Upper Methow River (Rockview Ditch) - existing - Wolf Creek (Biddle Ponds) – existing - Winthrop NFH - existing	All categories (section 2.2)
PIT tagging	7,000 smolts each year	8,000 smolts each year	Natural Production – survival
PIT tag detection	At existing facilities at Rocky Reach, McNary, John Day, and Bonneville dams	At existing facilities at Rocky Reach, McNary, John Day, and Bonneville dams	Natural Production – survival
Screw trapping	Near 2-3 acclimation sites, one of which is at Lake Wenatchee outflow (Apr 1–Jul 31).	None—no predation studies in this basin	Ecological Interactions – direct predation
Electro-fishing, beach seining	Apr 25 – Jul 15 (alternatives if screw trapping is unsuccessful)	None—no predation studies in this basin	Ecological Interactions – direct predation
Fish measurements	At screw traps, traps sampled and all species collected and measured at least hourly, 24 hrs a day.	None—no traps in this basin.	Ecological Interactions – direct predation
Redd counts	Basin-wide, but concentrated near release areas, using rafts or walking in streams, bi-weekly.	Basin-wide, but concentrated near release areas, using rafts or walking in streams, bi-weekly.	Natural Production – spawning distribution
Radio-telemetry	Up to 100 returning adults at Priest Rapids, Tumwater or Dryden dams.	Up to 100 returning adults at Wells Dam.	Natural Production – spawning distribution
Stomach analysis	Up to 6,000 coho captured in screw traps.	None.	Ecological Interactions - predation
Snorkeling	Spot checks near release areas spring through fall	Spot checks near release areas spring through fall	Natural Production - migration timing, residualism
Hatchery broodstock development/egg banking	Use existing facilities. Possibilities include: - Hatcheries - Entiat, Winthrop, Leavenworth, Turtle Rock, or other appropriate Federal, State, PUD or Tribal facility - Adult trapping – Tumwater, Dryden, Priest Rapids, Rocky Reach, or Wells dams; at hatchery where adults return; or at Chiwawa weir. Collect adults from several sites to ensure maximum genetic variability. - Adult holding – Same locations as "Hatcheries" above, except Leavenworth		
DNA analysis/-genetic monitoring	Experimental design to be determined – up to 240 coho would be fin-clipped or sacrificed for analysis and monitoring purposes.		

Figure 2
Wenatchee River Subbasin

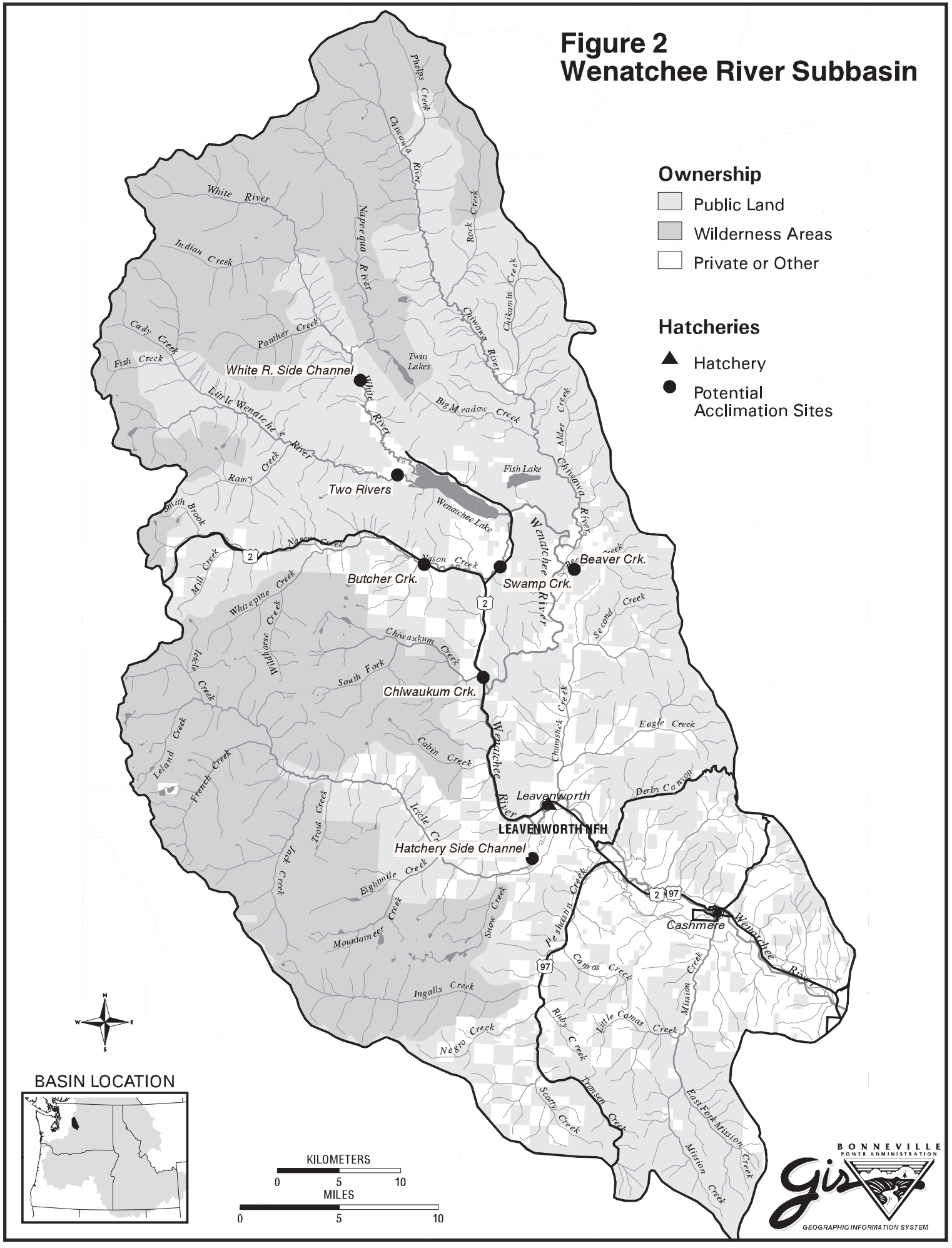
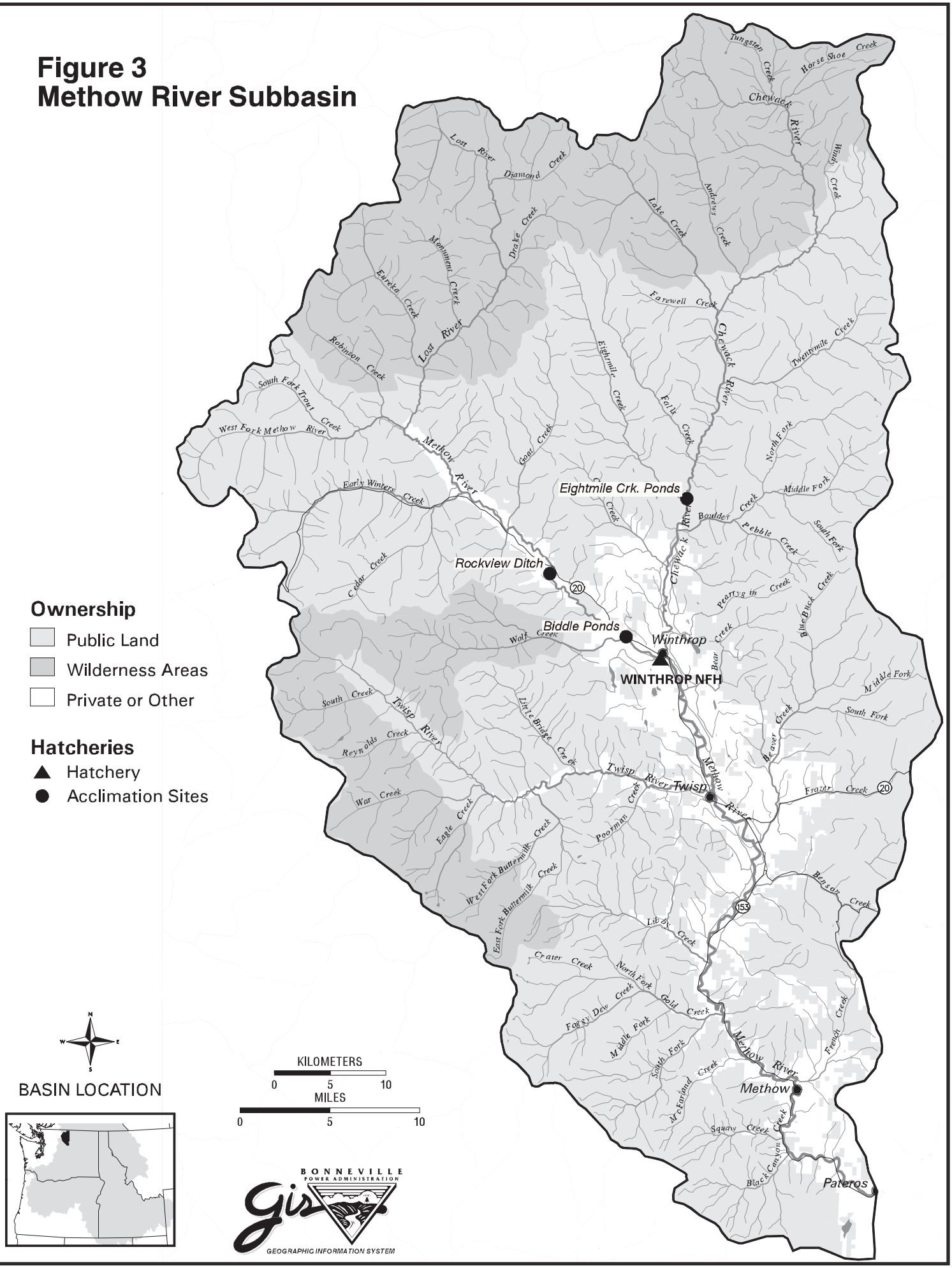


Figure 3
Methow River Subbasin



2.3 Phased Study Alternative

The underlying reason for this alternative would be to minimize risks to other species of concern by studying one basin at a time. Only studies proposed for the Wenatchee basin, as described in the Proposed Action, would be done. No work would take place in the Methow. Future work in the Methow would be contingent upon results from the Wenatchee studies and from Yakima basin studies being done as part of a separate project (see section 1.4). Program costs would be $850,000 over a two-year period.

2.4 Hatchery Releases Alternative

This alternative is designed to answer one key question: can adult coho return to the mid-Columbia in sufficient numbers to replace themselves? Smolts would be released only from hatcheries in the Wenatchee basin, on the theory that, if coho cannot return to the Wenatchee basin in sufficient numbers, they are unlikely to be able to return to the Methow with two more dams to pass and the longer migration distance. Acclimation in natural habitats would not take place. Coho would not be released in known spring chinook habitat and predation studies would not be done. Studies of the coho's ability to naturally reproduce also would not be conducted.

Smolt release numbers would be based on the number needed to produce enough adults to maintain a genetically viable population (i.e., 100 adult males and 100 adult females). Current survival rates average only 0.03%; for a population to replace itself, a 0.1% survival rate is required. This alternative would test whether that rate is achievable. Returning adults would be counted and collected at the hatchery release sites.

Program costs would be $600,000 over a two-year period.

Table 2 Activities Required for Hatchery Releases Alternative

Activity	Wenatchee	Purpose
Smolt releases	250,000 (Apr 25–May 30)	Survival, long-term fitness
Release sites	Icicle Creek Side Channel or pond at Leavenworth National Fish Hatchery.	Survival, long-term fitness
PIT tagging	7,000 smolts each year	Survival
PIT tag detection	At existing facilities at Rocky Reach, McNary, John Day, and Bonneville dams.	Survival
Redd surveys	These would be done only if large differences were found between numbers of returning adults counted at the dams and the number collected at the hatchery.	Survival
Snorkeling	Intensive monitoring near release areas spring through fall.	Migration timing, residualism, risk management
Hatchery brood-stock develop-ment/egg banking	Use existing facilities. Possibilities include: - Hatcheries - Entiat, Winthrop, Leavenworth, Turtle Rock, or other appropriate Federal, State, PUD or Tribal facility - Adult trapping – At hatchery where adults return - Adult holding – Same locations as “Hatcheries” above, except Leavenworth	
DNA analysis/-genetic monitoring	Experimental design to be determined – up to 240 coho would be fin-clipped or sacrificed for analysis and monitoring purposes.	

2.5 Comparison of Alternatives

Table 3 indicates whether the Proposed Action and Alternatives accomplish the purposes BPA and project participants hope to achieve. The conclusions are discussed after the table.

Table 3 Predicted Performance Summary

Purposes	Proposed Action	Phased Study Alternative	Hatchery Releases Alternative	No Action
Increases knowledge about coho and their interactions with the environment to sufficient decision-making detail.	Greatest potential to answer a full range of questions.	Good potential to answer a full range of questions, but additional studies most likely would be needed.	Addresses only the question of coho survival.	Would provide very little information.
Protects species of fish listed or proposed for listing under ESA in the mid-Columbia tributaries.	Some question of risk to spring chinook, bull trout, and sockeye. Highest level of monitoring and risk management.	Similar to Proposed Action.	Less risk than Proposed Action but predation would not be monitored, so less risk protection.	Risk could be similar to Hatchery Releases Alternative, depending on location of releases, but no monitoring would be done.
Achieves cost and administrative efficiency for BPA fish mitigation efforts.	Highest cost to BPA in short term but most efficient.	Costs less than Proposed Action in the short term but increases administrative complexity.	Costs less than Proposed Action or Phased Study, but increases administrative complexity.	No cost to BPA and requires no administration.
Complies with all applicable laws, regulations, and Executive Orders.	Yes.	Yes.	Yes.	Depends on how it is implemented; responsibility is not with BPA.

Increases knowledge about coho and their interactions with the environment to sufficient decision-making detail.

- The Tribal Alternative has the greatest potential of all the alternatives to answer a wide range of questions surrounding coho reintroduction, including whether they can survive, return to the mid-Columbia, and naturally reproduce; and whether their presence adversely affects other species of concern.
- The Phased Study Alternative has good potential to begin to address the full range of questions; however, additional studies most likely would be needed to identify differences in feasibility potential between the Wenatchee and Methow basins, lengthening by years the time required to answer questions compared to the Tribal Alternative.
- The Hatchery Releases Alternative would answer only one question surrounding coho reintroduction: whether coho can survive and return to a mid-Columbia basin. It does not test the theory that acclimation in natural ponds increases survival rates, nor does it address predation questions.
- The No Action Alternative does not increase knowledge about coho reintroduction because no monitoring of releases for research currently is planned.

Protects species of fish listed or proposed for listing under ESA in the mid-Columbia tributaries.

- The Proposed Action raises the strongest question about potential risk to listed species because it includes a proposal to study coho predation on spring chinook, a species listed as endangered under ESA, and trapping could adversely affect migrating adult bull trout, listed as Threatened. In addition, two proposed acclimation sites may create the potential for predation on sockeye salmon, listed by the State of Washington as Vulnerable/Species of Importance. However, this alternative also has the highest level of monitoring of predation and competition effects on sensitive species.
- For the Phased Study alternative, the risk of effects to sensitive species would be similar to the Proposed Action, even though studies would not be undertaken in the Methow. In the Methow, there is little opportunity for predation of coho on sensitive species (see section 3.3.1.2), and consequently, less monitoring was proposed in that basin.
- The Hatchery Releases Alternative would have the lowest potential for risk to sensitive species because coho would be released downstream of most spawning/rearing areas for sensitive species. Because the effect of predation would not be monitored, there would be little risk protection.
- For the No Action Alternative, the risk to sensitive species could be similar to the Hatchery Releases Alternative, depending on the location of releases. Similarly, no monitoring would be done.

Achieves cost and administrative efficiency for BPA fish mitigation efforts.

- The Proposed Action is the highest cost to BPA in the short term but compared to the other alternatives, is less administratively complex because only one other decision-making process likely would be required: Whether or not to implement full-scale coho reintroduction.
- The Phased Study Alternative would be less expensive than the Proposed Action in the short term because no studies would be done in the Methow basin in the next two years. However, additional studies could be needed, which would add to the longer-term cost and require an additional decision-making process for BPA as well as for several other entities (including NMFS, USFWS, YIN, the Council, and WDFW) compared to the Proposed Action.
- The Hatchery Releases Alternative probably would cost slightly less than the Phased Study Alternative in the short term, but because predation and other ecological interaction studies undoubtedly would be needed before full-scale reintroduction of coho could be proposed, additional decision-making processes would be required for BPA as well as for other entities.
- Because coho releases would be undertaken under the auspices of other entities, the No Action Alternative would cost nothing to BPA and would require no administration for BPA and no new administrative processes for other entities beyond those that currently exist.

Complies with all applicable laws, regulations, and Executive Orders.

- Under the Proposed Action, Phased Study, and Hatchery Releases alternatives, BPA and project proponents would conduct all necessary consultations, obtain all required permits, and adhere to all conditions specified.
- Because the No Action alternative would be implemented by other entities, the responsibility for compliance does not rest with BPA.

Chapter 3 Affected Environment and Environmental Effects

3.1 Introduction

The research proposed for the four alternatives would occur in at least one of two tributary basins of the mid-Columbia River basin, the Wenatchee and Methow river basins (Figure 1). For each alternative, this chapter discusses the effects of three categories of research activity:

- Effects of incubating, rearing, and releasing coho, and collecting coho broodstock to provide the research fish (section 3.3).
- Effects of hatchery modifications, acclimation pond preparation and facilities operations required to conduct the research (section 3.4).
- Effects of monitoring activities (section 3.5).

The discussion focuses on the effects that are likely to occur during the two- to three-year time frame of the proposal. Some parts of the proposal could have long-term effects if the results of this research show that coho reintroduction in these basins is feasible and Phase 2 of the project is implemented. While this EA acknowledges the nature of those effects where appropriate, their in-depth analysis will be deferred until the time is ripe for decision-making for Phase 2.

The effects of the Proposed Action and the Phased Study alternative are described together because they would be the same, except that, under the Phased Study alternative, effects would not occur in the Methow Valley during the time period covered by the EA. The discussion in each category for the Hatchery Releases and No Action alternatives focuses on their differences from the first two.

Because the coho proposed for release as part of this project are considered research fish, the effects on the coho themselves are not analyzed in this EA.

Table 4 summarizes the impacts that are discussed in detail in the remainder of this chapter.

Table 4 Summary of Environmental Impacts of Proposal and Alternatives

Impact	Proposed Action	Phased Study	Hatchery Releases	No Action
Effects of Coho Incubation, Rearing, and Releases, and Selecting Broodstock				
Artificial selection	Long-term trend towards naturalization and local adaptation; little effect for the period of this EA.	Same as Proposed Action.	Less long-term potential for naturalization than Proposed Action because no acclimation in natural surroundings, but similar to Proposed Action for the EA period.	No potential for naturalization because smolts would be trucked from lower Columbia hatcheries and released with no acclimation.
Loss of within-population genetic variability	Low risk because no wild population exists.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Coho straying to other basins	Low risk because coho would be acclimated.	Same as Proposed Action.	Same as Proposed Action.	Higher risk than other alternatives because coho would not be acclimated.
Coho predation on species of concern—spring chinook (Endangered), bull trout (Threatened), and sockeye (Vulnerable)	Some risk to spring chinook from releases in Wenatchee and Methow and from Wenatchee predation study; some risk to sockeye from releases above Lake Wenatchee. Slight risk to bull trout from returning coho. Risk managed through monitoring and other measures.	Same risks as Proposed Action for Wenatchee. No risk in Methow, because no studies done there. Risks managed the same as for Proposed Action.	Slight risk from releases in Wenatchee; however, predation would not be monitored, so little risk protection.	Some risk from releases because locations unknown. Risk would not be monitored, so little risk protection.
Competition for use of habitat between coho and other species of concern	Low risk to other fish species due either to lack of overlap in microhabitats and/or rapid outmigration of coho. Low risk mitigated through release practices.	Same risk as for Proposed Action, except no risk in Methow basin because no studies would be done there.	Somewhat lower than Proposed Action because coho would be released from hatchery site lower in the basin, thus avoiding most sensitive species' habitat.	Similar to Proposed Action because release locations unknown.
Transfer of disease to other species	Low risk due to use of IHOT standard disease control practices.	Same as Proposed Action.	Slightly higher risk than Proposed Action because more fish could become diseased due to higher densities during rearing.	Similar to Hatchery Releases Alternative.

Table 4 (continued)

Impact	Proposed Action	Phased Study	Hatchery Releases	No Action
Effects of Hatchery Modifications and Operations				
Construction effects at Winthrop NFH to increase water supply	Little or no ground disturbance or increased sedimentation because existing pipeline would be tapped or temporary pipe installed above ground.	Same as Proposed Action.	Same as Proposed Action.	No impacts would occur because existing lower Columbia facilities would continue to be used as they are now.
Increased water use, waste and water discharges, and fish and chemical wastes	Existing permits expected to be sufficient, but if not, will be modified before production begins.	Same as Proposed Action, except amount of increase may be lower without releases in Methow.	Similar to Proposed Action: fewer fish reared but kept at hatchery longer.	No impacts because existing lower Columbia facilities would be used as they are now.
Effects of Development and Use of Acclimation Sites				
Water use	Temporary, non-consumptive water rights might be needed for one new site in Wenatchee; temporary rights for existing sites in Methow would be renewed.	Same as Proposed Action for Wenatchee; Methow sites would not be used.	None needed because new acclimation sites would not be developed.	None needed because new acclimation sites would not be developed.
Impacts to recreational areas/visual quality	Winter sports users could be concerned if USFS road to White River site is plowed. No effect on candidate Wild & Scenic Rivers or recreational boaters.	Same as Proposed Action.	No impact—no new sites developed.	No impact—no new sites developed.
Destruction of sensitive plants	Potential impacts to two sensitive plant species and wetland-/riparian vegetation at Two Rivers site. If plants found, they would be avoided or site would not be used.	Same as Proposed Action.	No impact—no new sites developed.	No impact—no new sites developed.

Table 4 (continued)

Impact	Proposed Action	Phased Study	Hatchery Releases	No Action
Effects of Development and Use of Acclimation Sites (continued)				
Construction effects in floodplains	All but Hatchery Side Channel/pond in 100-yr. floodplain; potential for impact at Two Rivers site only, due to work required.	Same as Proposed Action.	No impact—no new sites developed.	No impact—no new sites developed.
Construction effects in wetlands	Most sites likely to be in wetlands; only Two Rivers channel has potential for impact due to modifcations required. Site designs and mitigation would ensure no net loss of wetlands.	Same as Proposed Action.	No impact—no new sites developed.	No impact—no new sites developed.
Disturbance of wildlife	Several listed species are found in the region. Gate on road into White River would reduce potential disturbance to grizzly bears (Threatened). Beaver could be temporarily disturbed at Butcher Cr. and White River.	Same as Proposed Action.	No impact—no new sites developed.	No impact—no new sites developed.
Disturbance of cultural resources	Existence of resources unknown; surveys required for channel at Two Rivers site.	Same as Proposed Action.	No impact—no new sites developed.	No impact—no new sites developed

Table 4 (continued)

Impact	Proposed Action	Phased Study	Hatchery Releases	No Action
Effects of Monitoring Activities				
Stress, mortality from PIT tagging of juvenile coho	Up to 20% mortality to research coho from handling.	Same as Proposed Action.	Same as Proposed Action.	Same as Proposed Action.
Adult coho mortality from handling stress.	Up to 10-15% mortality.	Same as Proposed Action.	No impact because these studies would not be done.	No impact because these studies would not be done.
Potential for injury, increased predation among juveniles in screw traps; inconvenience to recreational boaters (Wenatchee only)	Risk minimized by frequent monitoring. ESA Section 7 consultation required for spring chinook, steelhead, bull trout due to potential for harm. Boaters could not pass traps in water; traps would be flagged, sited away from high-use areas.	Same as Proposed Action.	No impact because predation studies would not be done.	No impact because predation studies would not be done.
Potential mortality from electro-fishing	Used only if screw trapping unsuccess-ful. Risk minimized by using experi-enced personnel and following NMFS guidelines.	Same as Proposed Action.	No impact because predation studies would not be done.	No impact because predation studies would not be done.
Stress from handling during beach seining	Used only if screw trapping unsuccess-ful. Low risk of harm.	Same as Proposed Action.	No impact because predation studies would not be done.	No impact because predation studies would not be done.
Risk of stress, injury and mortality during handling for measurements	Standard research techniques used. Risk minimized by using experienced, qualified personnel.	Same as Proposed Action.	No impact because these studies would not be done.	No impact because these studies would not be done.
Coho mortality for stomach analyses, genetic sampling	Up to 6,000 coho research smolts sacrificed (0.6% of releases); impact not considered adverse. Spawned adults used for genetic sampling would die anyway.	Same as Proposed Action.	No impact because predation studies would not be done.	No impact because predation studies would not be done.
Impacts of survey techniques	Minor disturbance to fish near release sites.	Same as Proposed Action.	Slightly greater than Proposed Action: surveys more intense.	No impact because these studies would not be done.

3.2 Background

3.2.1 History of Mid-Columbia Coho and Their Habitat

Historically, mid-Columbia coho salmon production occurred throughout many of the basin's tributaries. Major Columbia River tributaries in this area include the Wenatchee, Entiat, Methow, and Okanogan rivers. The primary tributaries for the two basins that are the subject of this EA include: Icicle, Peshastin, and Nason creeks and the Little Wenatchee, Chiwawa and White rivers (Wenatchee River [Figure 2]); and the Twisp and Chewuch rivers (Methow River [Figure 3]). All the major upper river basin tributaries supported coho.

Mullan (1983) estimated historical mid-Columbia River adult coho populations as follows:

- Wenatchee—6,000 - 7,000
- Methow—23,000 - 31,000

Mid-Columbia coho salmon populations were decimated in the early 1900s by impassable dams and unscreened irrigation diversions in the tributaries along with an extremely high harvest rate in the lower Columbia River. The loss of natural stream flow degraded habitat quality and further reduced coho productivity. Irrigation, livestock grazing and mining were major contributors to salmon habitat destruction before 1910. Later, timber harvest and fire management, in addition to irrigation, assumed more importance. Before 1920, 27 major dams were built in the Columbia River tributary basins (Wissmar et al. 1994). The construction of dams in the tributaries also degraded habitat and blocked fish access to large portions of the upper Columbia River basin.

Coho have also suffered the additional impacts of extremely heavy harvest exploitation in ocean and lower Columbia River fisheries. An intensive fishery conducted from The Dalles to the mouth of the river was considered the biggest harvest impact to the upriver stocks (McDonald 1895).

Indigenous natural coho salmon no longer occupy the mid-Columbia river basins. Since Priest Rapids Dam was completed in 1960, the peak escapement of adult coho upstream of the dam was probably never greater than 10,000 coho and has not exceeded 1,300 coho since 1974 (WDFW/ODFW 1998). Since 1988, adult counts at Priest Rapids Dam have averaged only 16 coho, probably a result of releases from Turtle Rock Hatchery, which annually released about 600,000 coho smolts until the program was terminated in 1994. (WDFW/ODFW 1995).

For several reasons, self sustaining coho populations were not established in mid-Columbia basins despite plantings of 46 million fry, fingerlings, and smolts from Leavenworth, Entiat, and Winthrop National Fish hatcheries between 1942 and 1975:

- The construction and operation of mainstem Columbia River hydropower projects were detrimental to mid-Columbia River salmonid populations because of the number of dams and reservoirs through which they had to pass, leading to deaths from turbines, gas bubble trauma, and so forth.
- A substantial amount of critical physical fish habitat was lost or severely degraded (Tyus 1990; Petts 1980; Diamond and Pribble 1978).

- Existing coho programs were poorly administered, unsuccessful, or lower priority than programs for other salmonid species. For example, the most recent coho hatchery program in the mid-Columbia region was at Turtle Rock Hatchery, funded by Chelan P.U.D. The coho program was terminated because continual disease problems during the summer months required that the fish be constantly medicated. Unhealthy fish were released, which resulted in poor adult returns. Because fall chinook and steelhead were higher priority species, they were given priority use of the limited supply of high quality hatchery water. These species currently constitute the program at Turtle Rock. The last coho releases were in 1994.

Since that time, conditions and practices have changed to a certain degree. Some of the local habitat causes of coho depletion have been corrected, although there is still work to be done. For example, many irrigation diversions have been screened, tributary dams have been removed, mining has ended, and improvements in grazing practices have been made. Similar improvements have been made on the mainstem Columbia. The recent ESA listings of several salmonid species that migrate through the lower Columbia River have curtailed coho fisheries that once over-harvested the mid-Columbia stocks of coho. These fisheries restrictions are likely to be in effect for a number of years. Continued improvements are expected with the ongoing regional attention to these issues.

3.2.2 Coho Life Cycle and Habitat

Because the historical stocks of coho were decimated near the turn of the century, most life history information was obtained through affidavits from older residents. The historical information supports the fact that these fish were probably early-returning-type adults, ascending the mid-Columbia tributaries in August and September (Mullan 1983).

Lower Columbia River early-returning-type hatchery coho salmon spawn from October to mid-December. Columbia River coho salmon typically spend one year in freshwater before outmigrating as yearling smolts in the spring (April/May). After outmigrating, coho salmon spend approximately 18 months at sea before returning to spawn. Sexually precocious males (jacks) return to spawn after six months at sea.

Historically, mid-Columbia coho salmon production occurred throughout many of the basin's tributaries, as described in section 3.2.1. Little is known about the historic coho spawning spatial distribution. Returning adult coho are expected to spawn near where the smolts were acclimated. However, some straying of an unknown distance may occur. Coho are reported to use a varied size range of substrate for spawning, from fine gravel to course rubble, but which typically is 15 cm (6 in) in diameter and smaller (Groot and Margolis 1991). While in freshwater, the diets of juveniles are generally dominated by aquatic and terrestrial invertebrates, but they may prey upon crustaceans and other juvenile fish to a lesser extent (Groot and Margolis 1991).]

3.2.3 Other Fish Species in the Wenatchee and Methow Basins

Many of the potential impacts of the proposal and alternatives center on interactions between coho and other fish species in the basin, particularly species considered sensitive in some way. Fish species found in the two basins are listed in Table 5. Table 6 shows species of special concern and their status. Table 7 shows how life cycles of salmonids in the basins relate to each other.

Table 5 Anadromous and Resident Fish Species in Wenatchee and Methow Basins

Anadromous	Resident
Spring chinook salmon	Rainbow trout Redband trout
Summer/fall chinook salmon	Cutthroat trout Westslope cutthroat trout
Coho salmon*	Eastern brook trout**
Summer steelhead trout	Bull trout
Sockeye salmon (W)	Brown trout**
	Lake trout
	Smallmouth bass**
	Largemouth bass (W)**
	Yellow perch (W)**
	Mountain whitefish
	Largescale sucker
	Longnose dace
	Redside shiner
	Sculpin

*Note: There is no evidence that a self-sustaining population of coho remains in either basin.
**Note: These species are not native to these basins.

Table 6 Special Status Species in the Wenatchee and Methow Basins

Common Name	Endangered Species Act*	Washington Species Criteria**
Spring chinook salmon	Endangered	Vulnerable/Species of Importance
Summer/fall chinook salmon		Vulnerable/Species of Importance
Coho salmon		Vulnerable/Species of Importance
Sockeye salmon		Vulnerable/Species of Importance
Steelhead trout	Endangered	Species of Importance
Rainbow trout		Species of Importance
Bull trout	Threatened	Vulnerable/Species of Importance

*Definitions under the Endangered Species Act include:

Endangered Species: Any species in danger of extinction throughout all or a significant portion of its range.

Threatened Species: Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

**WDFW species criteria (WDFW 1996) include:

Vulnerable: Species or groups of animals susceptible to significant population declines within a specific area by virtue of their inclination to aggregate, e.g., in fish spawning and rearing areas.

Species of Importance: Native and non-native fish species of recreational, commercial, or Tribal ceremonial and subsistence importance that are vulnerable to habitat loss or degradation.

Life History Timing of Methow and Wenatchee Salmonoids

Species	Life Stage	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Source
Chinook (Spring)	Adult Immigration					■	■	■	■					USFS, 1995
	Adult Holding								■	■				
	Spawning									■	■			
	Incubation	■									■	■	■	
	Emergence		■	■										
	Rearing	■	■	■	■	■	■	■	■	■	■	■	■	
	Juvenile Emigration				■	■	■	■	■					
Chinook (Summer)	Adult Immigration								■	■	■			WDW et. al., 1990
	Adult Holding									■	■			
	Spawning									■	■	■		
	Incubation									■	■	■	■	
	Emergence	■	■	■	■									
	Rearing	■	■	■										
	Juvenile Emigration				■	■	■	■	■	■	■			
Chinook (Fall)	Adult Immigration										■	■		Caldwell & Catterson, 1992
	Adult Holding										■	■		
	Spawning											■		
	Incubation	■	■									■	■	
	Emergence		■	■										
	Rearing			■	■	■	■							
	Juvenile Emigration						■							
Sockeye	Adult Immigration							■	■	■	■			Caldwell & Catterson, 1992
	Adult Holding								■	■	■			
	Spawning									■	■	■		
	Incubation	■	■	■	■					■	■	■	■	
	Emergence				■	■								
	Rearing	■	■	■	■	■	■	■	■	■	■	■	■	
	Juvenile Emigration				■	■								
Coho	Adult Immigration										■	■	■	Mullan et. al., 1992
	Adult Holding											■		
	Spawning											■	■	
	Incubation	■	■	■									■	
	Emergence		■	■	■									
	Rearing	■	■	■	■	■	■	■	■	■	■	■	■	
	Juvenile Emigration				■	■	■							
Steelhead (Summer)	Adult Immigration	■	■	■	■	■			■	■	■	■	■	USFS, 1995
	Adult Holding	■	■	■					■	■	■	■	■	
	Spawning			■	■	■	■							
	Incubation						■	■	■					
	Emergence								■	■				
	Rearing	■	■	■	■	■	■	■	■	■	■	■	■	
	Juvenile Emigration				■	■								
Cutthroat & Rainbow Trout	Spawning				■	■								Wydoski & Whitney, 1979
	Incubation				■	■	■							
	Emergence						■	■						
	Rearing	■	■	■	■	■	■	■	■	■	■	■	■	
Brook Trout	Spawning								■	■	■	■	■	Wydoski & Whitney, 1979
	Incubation	■	■	■						■	■	■	■	
	Emergence	■	■	■	■								■	
	Rearing	■	■	■	■	■	■	■	■	■	■	■	■	
Brown Trout	Spawning										■	■	■	Wydoski & Whitney, 1979
	Incubation	■	■	■								■	■	
	Emergence	■	■	■	■								■	
	Rearing	■	■	■	■	■	■	■	■	■	■	■	■	
Bull Trout	Spawning									■	■	■		Wydoski & Whitney, 1979
	Incubation	■	■	■							■	■	■	
	Emergence	■	■	■	■									
	Rearing	■	■	■	■	■	■	■	■	■	■	■	■	
Mountain Whitefish	Spawning										■	■	■	Wydoski & Whitney, 1979
	Incubation	■	■	■								■	■	
	Emergence		■	■	■									
	Rearing	■	■	■	■	■	■	■	■	■	■	■	■	

Note: Shading indicates presence, not relative abundance.

Table 8 lists spawning areas for certain sensitive species that are within 8 km (5 mi) of coho acclimation sites in the Wenatchee and Methow basins. Please see figures 2 and 3 in chapter 2 for acclimation site locations. Other known spawning areas in the two basins that are a greater distance from acclimation sites are listed by species and stream below.

Table 8 Spawning Areas for Sensitive Anadromous Species Near Coho Acclimation Sites*

Basin/Water Body	Spring chinook	Summer chinook	Sockeye	Steelhead	Bull trout
Wenatchee					
Nason Cr.	X			X	
Little Wenatchee R.	U		U	X	U
Wenatchee R. mainstem		X		X	
White R.	U		X	X	U
Chiwawa R.	U			U	
Icicle Cr.				X	Uncertain
Methow					
Upper Methow R.	X				
Methow R. mainstem				X	
Chewuch R.	X	X		X	
Wolf Cr.					U
Goat Cr.				U	

*Legend:

X = spawning area overlaps with coho acclimation site

U = spawning area is no further than 8 km (5 mi) upstream of acclimation site

Other known spawning areas for sensitive anadromous species are listed below. The areas are all over 8 km (5 mi) from coho acclimation and release sites evaluated for this project.

- **Spring chinook**: Methow basin—Twisp River, Lost River

- **Steelhead:** Wenatchee basin—Mission Creek, Peshastin Creek; Methow basin—Gold Creek, Libby Creek, Beaver Creek, Twisp River, Early Winters Creek, Lost River
- **Bull trout:** Wenatchee basin—Ingalls Creek, Chiwaukum Creek, Nason Creek, Chiwawa River, Chickamin Creek, Rock Creek; Methow basin—Foggy Dew Creek, Crater Creek, Buttermilk Creek, Reynolds Creek, Twisp River, Blue Buck Creek, Lake Creek, Goat Creek, Early Winters Creek, Cedar Creek, West Fork Methow River, Monument Creek, Lost River

3.2.4 Other Fish Management Activities Proposed for the Mid-Columbia

Three mid-Columbia Public Utility Districts (PUD)—Chelan County PUD, Douglas County PUD, and Grant County PUD—are preparing a Biological Assessment and Management Plan (Management Plan) for the Mid-Columbia River Hatchery Program. The Management Plan would address Endangered Species Act issues for fish hatcheries in the Wenatchee, Methow, and other mid-Columbia basins. The National Marine Fisheries Service, U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, and the Confederated Tribes of the Yakima Indian Nation, Colville Indian Reservation, and Umatilla Indian Reservation are all participating in the consultation.

The Management Plan addresses a comprehensive program to help recover spring chinook, steelhead, summer/fall chinook, and sockeye populations in these basins. The actions proposed in the Wenatchee and Methow basins are described below for each species.

Spring chinook: The Management Plan proposes to supplement spring chinook populations at Leavenworth National Fish Hatchery and in the Chiwawa River, Nason Creek, and White River in the Wenatchee Basin. The Little Wenatchee population would not be artificially propagated, but left alone to serve as a reference population. In the Methow basin, a supplementation program is being implemented for the Methow and Chewuch populations using the returning adult population. A captive broodstock program may be initiated for the Twisp River population.

Steelhead: The preferred strategy for Wenatchee River steelhead is to collect broodstock on that river for propagation and release there only. The preferred strategy for the near-term for the Methow River is to continue broodstock collection at Wells Dam, and to investigate the means to collect local broodstock on the Methow River for the long term.

Summer/fall chinook: The strategy for summer/fall chinook is to continue to propagate yearlings to compensate for dam mortalities; to evaluate the genetic, ecological, and demographic characteristics of the natural populations throughout the hatchery program; and to recognize the risk that potential impacts may not be detected in sufficient time to correct them. Means to collect local broodstocks on the Methow River will be studied.

Sockeye: There are two populations of sockeye salmon in the mid-Columbia region, from the Wenatchee and Okanogan rivers. Both currently have a low risk of extinction. The current production would be increased from 200,000 yearlings to 725,000 fish of various ages from Wenatchee River. The number of each population to be produced, and the means to propagate them will depend on several factors outside the scope of the Management Plan.

BPA and the YIN are coordinating the proposals under the Mid-Columbia Coho Reintroduction Project with the Management Plan through the Mid-Columbia Coordinating Committee and consultation with NMFS. We do not believe that the coho proposal would interfere with the Management Plan actions, and will continue to coordinate to ensure that they do not as both projects continue to be defined and evolve.

Resident fish: The State of Washington has conducted several resident fishery programs in the basin in the past; however, because of endangered species in the basin, the only currently open fishery is on whitefish, which ends at the end of March. In addition, the state no longer plants trout in anadromous fish habitat.

3.3 Effects of Incubating, Rearing, and Releasing Coho, and Selecting Coho Broodstock

3.3.1 Proposed Action and Phased Study Alternatives

Because coho salmon have been extirpated in the Wenatchee and Methow basins, the proposed research into the feasibility of reintroducing the species relies on development of a coho broodstock from lower Columbia River populations.[4] No wild stock from the mid-Columbia exists to use, and wild stocks from other areas such as British Columbia are unavailable. The lower river stock has been essentially a hatchery stock since the 1960s and is considered domesticated. Because a few coho are returning to the mid-Columbia from earlier releases, despite the program and habitat limitations of earlier years described in section 3.2.1, researchers believe the potential exists for broodstock development to succeed using this stock. Genetic effects of this activity would be limited primarily to the potential benefit of increasing the naturalization of a domesticated stock. These effects are discussed in detail in section 3.3.1.1.

The research also relies upon releases of large numbers of hatchery coho in order to test their survival, reproductive success, and interactions with other species, and to provide adequate returns for broodstock development. Currently, based on the 95% confidence interval calculated for Yakima River coho smolt-to-adult survival data, coho released in the mid-Columbia tributaries are expected to survive at rates between 0.043% and 0.11%. In the long term, the proposed project would attempt to improve on those rates.

Another key aspect of the research is acclimation in semi-natural environments whenever possible. Juvenile coho are typically acclimated for 4-6 weeks prior to liberation, but depending on experimental objectives, could be acclimated from 2 to 8 weeks. During that period, fish culturists periodically feed the pre-smolts a predetermined amount of fish food pellets. This amount is calculated based on number and size of fish, and on water temperature. Typical fish culture activities include net maintenance, pond cleaning (if applicable), mortality assessments,

[4] The fish would come from Lewis River, Cascade, and/or Eagle Creek hatcheries. The original source of the Lower Columbia River stock was the Toutle River stock. The LCR stock also has had recent infusions of Sandy River stock.

and growth and fish health measurements. Fish are exposed to a semi-natural rearing environment, conditioning them for survival in the natural environment.

In order to study ecological risks of a reintroduction program, the proposed research may increase the risk for those effects, such as predation by coho on other species, indirect predation effects such as "shielding" or "chumming," competition between coho and other species, and disease transmission. These effects are discussed in section 3.3.1.2.

3.3.1.1 Genetic Effects

Artificial Selection

The primary genetic effect of the coho broodstock development, rearing and release portions of this project's research is expected to be a long-term trend towards naturalization and local adaptation of the population.

When hatchery breeding and rearing is used to supplement the populations of existing natural stocks in a particular area, a risk exists that hatchery conditions and practices will encourage artificial selection of fish and fish behaviors that are suitable for the hatchery environment but reduce the fish's ability to survive in the wild. For example, if the fish selected for broodstock are not taken at random from the natural population, researchers may inadvertently increase artificial selection pressure for earlier spawning. Over several generations, if the fish are consistently spawned early, the hatchery population may mature weeks or even months earlier than the natural population.

Further, when large numbers of hatchery-bred fish breed with wild fish, there is concern that the genetic mixing may produce offspring with fewer of the traits that are important for survival in the natural environment.

This project, however, is unlikely to produce these adverse artificial selection effects for three reasons. First, the project is being undertaken in basins in which coho are extirpated, so there is no wild population to be adversely affected by a stock of hatchery origin, certainly not in the period of the proposed research that is the subject of the EA. If, however, the research shows that coho reintroduction could be feasible and a stock is developed that eventually naturalizes, then in the long term (during Phase 2 of the project, should it be implemented), measures would need to be taken to adjust the relative numbers of hatchery-raised and naturally produced broodstock to avoid artificial selection effects.

Secondly, the stock proposed for use as the starting point for development of the broodstock—a lower Columbia River stock—has been a hatchery-only stock since the 1960s and is already divergent from the native stocks. Given the hatchery practices proposed for this project, the stock is unlikely to become any more divergent than it already is.

Third, the Tribal and Phased Study alternatives propose rearing practices that are designed to improve local adaptation of the existing stock. Research on coho in the Yakima basin (CTWSR et al. 1997) has shown that the effects of acclimation tend to improve smolt-to-adult survival rates approximately four-fold. The mean smolt-to-adult rate for acclimated smolts (mean = 0.163%) was significantly ($p = 0.018$) higher than non-acclimated smolts (mean = 0.042%).

Genetic Variability

Loss of within-population variability is commonly associated with hatchery production. Loss can be due to genetic drift as a consequence of small population size or to non-random selection of hatchery broodstock. Since genetic variability is the raw material upon which selection acts, this loss in variability may manifest itself as a decreased responsiveness to natural selection, with a resulting drop in fitness.

In order to avoid problems associated with small **effective population** size such as **inbreeding** or **founder effects**, Integrated Hatchery Operations Team (IHOT) recommends that a minimum of 100 males and 100 females be used as broodstock (PRRG 1999). If, during this phase of the project, too few adults return to maintain an effective population size, their numbers would be supplemented either by adding lower river adults to the breeding pairs, by supplementing the next year's releases with lower river smolts, or a combination of both.

In addition, to maximize the potential for genetic variability and naturalization of the returning population (see "Artificial Selection" above), the project would initially use up to 90% of returning fish for broodstock, collected throughout the run. Hatchery fish that return to the mid-Columbia will have gone through a substantial selection process to survive the long migration and the variety of obstacles they encounter in the journey, which is expected to enhance the trend toward local adaptation. However, in the near term, a portion of all smolt releases likely would include lower river coho because returns may not be enough in the first two or three years to maintain effective population size. The primary effect of supplementing broodstock with lower river coho would be that adaptation to the mid-Columbia region would be slowed.

For the period covered by this EA, the broodstock selection process would be entirely random. While the genetics monitoring program would study returning coho for traits associated with survival and adaptability, any proposal to select for certain traits in developing broodstock would be evaluated in future decision-making processes (see section 1.4.2).

Straying

When individuals from one stock of anadromous fish return as adults to a river basin that is not in their natal area, genetic mixing with local stocks can introduce unwanted traits into the local population. It is unlikely that straying would be an issue for the Tribal and Phased Study alternatives because the proposal is to raise the fish in a mid-Columbia basin hatchery, acclimate them naturally, and release them in the basin in which they are acclimated. Under such conditions the fish are unlikely to stray into a lower river basin. However, if they did, their numbers would be very small, as only 100-1,500 returning adults are expected from the numbers proposed for release. In addition, if a few of the coho reared in the mid-Columbia were to stray into lower river basins, or even into basins further up the Columbia, in most cases they would be mixing with basically the same stock of coho, so no adverse effects would be expected.

3.3.1.2 Ecological Interactions

For this research, ecological interaction risks include direct predation by coho on other species of concern, indirect predation effects, competition between coho and other species, and transfer of

disease. Those ecological interactions that influence the survival, growth, or broad-scale distribution of the affected population would potentially be most serious in nature. Ecological risk may be greatest for endangered species or those of critically low abundance (Table 6).

In this section, examination of ecological interactions is limited to those that could occur within the Wenatchee and Methow river basins. Interactions with other species in the mainstem Columbia and downstream are discussed under the Cumulative Impacts section (3.6).

Predation

Predation effects can be direct or indirect and are related to the release of hatchery smolts into the natural environment. Hatchery smolts may prey on smaller fish, and birds and other fish may prey on hatchery fish. For this analysis, direct predation refers to coho consumption of another species. Indirect predation—either "chumming" or "shielding"—refers to either the increased or reduced levels of predation on other species as a result of the release of large numbers of coho smolts. "Chumming" refers to the response of predators attracted by the release of a group of hatchery smolts, which reduces the survival of co-mingling wild smolts. "Shielding" occurs when the predator base is overwhelmed by the presence of large numbers of hatchery smolts, thus increasing the survival rate of wild smolts.

Although the impact of predation on an individual prey animal is unambiguous, the impact on a population of prey is not. Depending on the abundance and productivity of the prey population, the impact of predation on the persistence and productivity of the prey population may range from negligible to serious. Effects are determined by the percentage of each species' diet that is made up of fish. Size of hatchery fish appears to be relevant to whether or not the supplemented species will prey significantly on other fish species (Hillman and Mullan 1989).

Coho salmon have been shown to prey on several species of salmonids including sockeye salmon (*O. nerka)* fry (Ricker 1941; Foerster and Ricker 1953; Ruggerone and Rogers 1992), pink (*O. gorbuscha*) and chum (*O. keta*) salmon fry (Hunter 1959), spring chinook fry (Dunnigan and Hubble 1998), and fall chinook salmon (Thompson 1966; Dunnigan and Hubble 1998).

In the Wenatchee and Methow basins, the species most at risk for direct predation is spring chinook; sockeye salmon could be at risk in certain parts of the Wenatchee basin. Spring chinook spawn in higher reaches of the watershed and so emerge from the gravel later than summer/fall chinook, due to the colder water; and they are smaller than coho when they begin migrating. Sockeye emerge at about the same time as coho and rear in habitat proposed for coho acclimation in the Wenatchee basin. Summer/fall chinook spawn lower in the watershed, and emerge sooner than coho. They are smaller than coho, and there has been concern that they would be prey for coho. However, studies in the Yakima basin, as discussed below, have shown that coho predation on summer/fall chinook is very low. Most resident trout and steelhead are not considered to be at risk because these species generally emerge from the gravel after coho have migrated downstream, or spawn in upper reaches of tributaries (i.e., bull trout). See tables 7 and 8, section 3.2.3.

Coho Salmon Predation on Fall Chinook

Studies of coho predation on fall chinook were conducted in the Yakima basin at the Chandler Juvenile Monitoring Facility (CJMF) in 1997 and 1998. They indicate that coho predation on

fall chinook was 0.1% of all fall chinook smolts produced above Prosser, or the equivalent of 3.7 fall chinook adults. However, researchers believe that the artificial conditions associated with CJMF create abnormal opportunities for predation (the fish are at unnaturally high densities in unnatural habitat with no cover against predators, and fish are potentially held several hours in the livebox before being examined) (Dunnigan and Hubble 1998).

Coho predation studies were also conducted in 1997 and 1998 in the open Yakima River (Dunnigan and Hubble 1998). There the observed rate of coho predation on fall chinook was zero: none of the coho sampled in either year contained remains of fall chinook. Calculations were then made, using two different methods, to estimate what total coho predation on fall chinook in the Yakima River might have been. Because the 1997 sample size was small, calculations made from it were not precise and the estimates ranged to absurd numbers. However, despite the small sample size, it seems likely that sampling reflected actual consumption rates in the river during the 1997 coho outmigration (Dunnigan and Hubble 1998). Conditions were not conducive for sight-feeding predators such as coho to be highly successful. Flows were extremely high and the water was turbid. Coho salmon migrated rapidly during this period (averaging 160 kilometers [100 miles] in 3 days) so the potential time for predation was limited. Predation rates on fall chinook by other sight-feeding predators such as smallmouth bass and northern pikeminnow (*Ptychocheilus oregonensis*) were also relatively low during this period in 1997. It also seems highly unlikely that impacts in the river during 1997 would have been high given that coho predation at CJMF in 1997 was low and CJMF is perhaps the worst-case scenario for fall chinook predation (see above) (Dunnigan and Hubble 1998).

Sample sizes in 1998 allowed for more precise estimates of the total number of fall chinook consumed in the open river. They show that, 95 times out of 100, in identical conditions, the maximum number of fall chinook smolts consumed in the entire Yakima River would be no higher than 349 smolts (or approximately 3.5 adult fall chinook) (Dunnigan and Hubble 1998).

Coho Salmon Predation on Spring Chinook

In 1998, the YIN studied coho predation on spring chinook, analyzing the stomach contents of coho sampled at a rotary trap in the Easton reach of the upper Yakima River. Of an estimated 803,880 spring chinook fry in the study reach, researchers estimated coho consumed between 93 and 324 spring chinook fry, depending on which analysis model was used (Dunnigan and Hubble 1998). Using what appeared to be the more reliable model of gut evacuation rates presented by He and Wurtsbaugh (1993), researchers estimated that the total number of adult spring chinook equivalents consumed was no higher than approximately 7 adults (or 0.38% of the potential number of returning adults to the study reach) (Dunnigan and Hubble 1998). Researchers believe that this experiment represented the worst-case scenario to test for direct coho predation on spring chinook fry for the proposed release time because the Easton reach has the highest density of spring chinook redds in the upper Yakima basin; and during the period of the experiment, spring chinook fry were abundant and available as potential prey items for the coho smolts. The predation rate might have been higher if the coho had been released earlier, when the newly emergent spring chinook were smaller and probably more vulnerable to predation. However, the test accurately represented the time period during which future coho releases would be made (Dunnigan and Hubble 1998).

In 1997, YIN snorkeling surveys in the Methow basin generally found emergent spring chinook fry in association with shallow (less than 12 inches), low-velocity backwater and spring brook channels, or close to large woody debris along shallow stream margins (Dunnigan and Hubble 1998). Wild coho juveniles progress through a series of preferred habitat types beginning with back eddies, then moving to log jams, undercut banks, open bank areas, and finally to fast water habitat (Lister and Genoe 1970). Dunnigan and Hubble's observations generally agree with Lister and Genoe's (1970), in that coho prefer deeper and faster water conditions than do spring chinook fry, so there is minimal spatial overlap and therefore limited opportunity for direct predation or competition. In addition, in the Methow, all adult spring chinook are being collected for an adult-based supplementation program, and for the period of this EA, most coho adults in both basins also would be collected for broodstock. Consequently, the opportunities for predation by naturally spawning progeny of these released fish would be minimal.

Overall, based on data collected to date by the YIN, direct predation has not been shown to be a significant risk to spring or fall chinook. There is, however, some uncertainty because the results are limited (only one data set with statistically significant results), and because the results are being applied to potential effects in a different basin.

Because of this uncertainty, coho releases in the Wenatchee basin would be sized, based on the Yakima data, so that impacts to spring chinook would not be significant. In addition, the direct predation study proposed in the Wenatchee Basin as part of the Tribal and Phased Study alternatives is designed to monitor coho predation on spring chinook juveniles in that basin, to rule out any basin-specific differences. (See section 2.2 [direct predation study described in Ecological Interactions] and Task 11 from the *Mid-Columbia Coho Salmon Study Plan* [YIN 1998].) This study would be undertaken only after consultation with NMFS to ensure that there would be no jeopardy to the spring chinook ESU (Evolutionarily Significant Unit)[5], which has been listed as endangered.

Coho Salmon Predation on Sockeye Salmon

The risks of coho predation on sockeye salmon could be similar to spring chinook. Sockeye spawn upstream of most of the proposed release areas, but a significant number rear in Lake Wenatchee and would be there, at prey sizes, at times when coho would be released. Although not listed under ESA, sockeye in this area are considered a vulnerable species because they are one of only two populations remaining in the Columbia River system (the other is in Lake Osoyoos [Okanogan River]) (Ken MacDonald, USFS, personal communication, 1999). Coho released from the White River Side Channels and Two Rivers sites, if used, could pose a risk to sockeye. The risk would be managed by implementing a predation study similar to that proposed for spring chinook, possibly using a WDFW screw trap at the Lake Wenatchee outfall.

Coho Salmon Predation on Bull Trout

Potential for coho predation on young-of-the-year bull trout would be limited due to the lack of geographic overlap between bull trout spawning and rearing areas in the Wenatchee and Methow rivers and proposed coho acclimation and release sites (Table 8). All proposed acclimation sites

[5] An Evolutionarily Significant Unit is a distinctive group of Pacific salmon (salmon, steelhead or sea-run cutthroat trout).

are **lacustrine**-type habitats that generally are not utilized by juvenile bull trout. Although one alternative coho acclimation site (White River Side Channels—Figure 2) is only 2.4 km (1.5 mi) downstream of bull trout spawning habitat, bull trout tend to stay on the spawning grounds until they are large enough not to be a prey-sized item for coho smolts. Predation of bull trout juveniles by coho smolts could become a problem in the long run if coho return to spawn upstream of the acclimation site in significant numbers, but that is unlikely under the timeframe of this EA. Conversely, coho might also benefit bull trout in the long run as coho juveniles probably would become prey for adult bull trout.

In sum, predation by coho smolts on other species is expected to be low either because coho would be actively migrating downstream and therefore be moving quickly away from other species' rearing areas; because habitats do no overlap; or because coho would be too small to prey on other species. While some risk to spring chinook needs to be imposed in order to study the potential for long-term risk to sensitive species, implementing the following mitigation measures as appropriate would minimize that risk:

- working with other fish managers to determine release sites and numbers that minimize risk but that also meet research objectives;
- releasing coho smolts in low densities;
- avoiding or delaying releases in habitat for sensitive species (except when the point of the research is to test coho predation on a specific species);
- releasing fish that more closely resemble sizes of wild coho, which tend to be smaller than hatchery fish[6]; and
- waiting until smolts are ready to actively migrate before releasing them.

Indirect Predation

An indirect predation study was initiated in 1998 in the Yakima basin, but the results were inconclusive; the study results and experimental design were compromised due to river conditions. The impacts of indirect predation on wild salmonid smolt survival are being investigated in the Yakima basin in 1999 because the known avian and fish predators are very abundant in the lower Yakima River (below Prosser Dam). Therefore, any impacts or benefits to wild smolts are most likely to be detected in an experiment conducted in the Yakima Basin. In other words, the Yakima probably presents a worst-case scenario for a potential negative impact on wild salmonid survival. Fewer such predators are expected in the Wenatchee and Methow rivers.

The annual production of all state and Federal anadromous salmonid hatchery programs in the mid-Columbia region is approximately 10.2 million fish. The largest number of coho released

[6] Throughout the geographic range of coho salmon, length at smoltification is relatively consistent. Groot and Margolis (1991) reported that mean smolt size in yearling smolts ranged from 75 (Andersen and Narver 1975) to 122 mm fork length (McHenry 1981), and smolt size in Minter Creek, Washington ranged from 95-106 mm (Salo and Bayliff 1958).

under any of the alternatives presented in this environmental assessment would represent an approximate 10% increase in the number of migrating salmonids in the region. This increase in production is unlikely to cause an increase in the functional or numeric response of either avian or fish predators in the area, and therefore impacts would be negligible.

Competition

Direct competition for food and space between hatchery coho and other species can result in displacement of other fish into less preferred areas, which can potentially affect their growth and survival. For competition to have an adverse effect, the same limited resource must be used by more than one species. However, in some instances, competition for space and food may clearly alter patterns of microhabitat utilization while having no effect on productivity or viability (Spaulding et. al 1989). Indeed, the small-scale shifts in use of habitat niches may represent a significant benefit at the community level because environmental resources are used more efficiently (Nilsson 1966).

Juvenile coho salmon are known to be highly aggressive compared to other juvenile salmonids; thus they may compete with hatchery or naturally produced spring and summer/fall chinook, steelhead or rainbow trout, and resident fishes under certain conditions. For example, in a study conducted by Stein et al. (1972) in an artificial stream, coho socially dominated **fall chinook**, and fall chinook grew faster alone than with coho present. However, Lister and Genoe (1970) suggested that coho and fall chinook do not interact in the natural environment because of size-related differences in microhabitat selection. Coho salmon displaced **spring chinook** from preferred microhabitats in the Wenatchee River drainage but did not measurably affect their growth or survival (Spaulding et al. 1989). YIN snorkeling surveys, as discussed under "Predation" above, showed that spring chinook and coho use different microhabitats (Dunnigan and Hubble 1998). Groot and Margolis (1991) also suggest that there is little habitat overlap between chinook and other salmonids including coho and sockeye, and that this habitat segregation provides a possible mechanism for reducing ecological interactions between the species.

Coho salmon and **rainbow/steelhead trout** are reported to share habitat along the western coast of North America from California to British Columbia (Frasier 1969; Hartman 1965; Johnston 1967; Burns 1971), with both species residing in freshwater for extended periods (Groot and Margolis 1991). However, the reported impacts of the presence of coho salmon on rainbow/steelhead trout are conflicting. Coho were shown not to affect steelhead growth or habitat use in the Wenatchee River (steelhead occupied different microhabitats than salmon) (Spaulding et al. 1989), and coho affected steelhead habitat use only to a small extent in another Washington stream (Allee 1974, 1981). However, Hartman (1965) concluded that strong habitat selection occurred in the spring and summer as a result of aggressive behaviors which were differentially directed by coho against steelhead in pools and by steelhead against coho in riffle habitats.

Coho salmon have been shown to displace **cutthroat trout** from pool habitat into riffle habitat (Glova 1984; 1986; 1987; Bisson et al. 1988), even though both species preferred pool habitat in the absence of the other species. Tripp and McCart (1983) observed increasing negative impacts on cutthroat trout growth and survival as coho stocking densities increased.

In 1998, the YIN conducted field experiments to address the impacts of coho on the growth, abundance, and broad-scale geographical displacement of cutthroat and rainbow/steelhead trout. Researchers found no evidence that coho salmon influenced the abundance of cutthroat or rainbow trout when they compared the abundance of each species at sites where coho were stocked as well as where coho were not stocked. Coho abundance was largely related to stocking location. In addition, they found no evidence that coho affected the growth of cutthroat or rainbow trout when they compared the condition factor of each species in areas with and without coho (Dunnigan and Hubble 1998).

Researchers were unable to locate any studies that investigated competitive interactions between **bull trout** and coho salmon. However, Underwood et al. (1992) investigated competitive interactions between hatchery steelhead and spring chinook juveniles and juvenile bull trout and concluded that competition between these species of hatchery fish and bull trout was not affecting abundance of bull trout or their use of microhabitats.

Little competitive interaction is expected between bull trout and coho smolts released in the mid-Columbia tributaries. Bull trout typically spawn in tributaries to the Wenatchee and Methow Rivers. Spawn timing in these tributaries is most likely similar to general patterns observed for the species, is related to water temperature and generally occurs from September to October (Pratt 1992). Spawning and rearing of bull trout is thought to be primarily restricted to relatively pristine and cold streams, often within the headwater reaches (Rieman and McIntyre 1993). The geographic overlap of the juvenile bull trout rearing habitat and the coho migratory path would be minimal for coho releases because the majority of juvenile bull trout rearing habitat is believed to occur upstream of proposed coho acclimation sites. Any opportunity for interaction with migrating smolts would be further limited due to the migratory behavior of coho smolts.

No published studies were found that demonstrated complete competitive exclusion (species extirpation) by coho of any species.

Rapid out-migration of hatchery fish is believed to decrease the risk of ecological interaction to wild fish (Steward and Bjornn 1990). Recent studies in the Yakima basin found that, on average, actively migrating PIT-tagged coho smolts migrated approximately 30.1 km (18.8 miles) per day. The later the fish were released and the higher the volume of water flowing in the river, the faster the fish moved. Migration rates for coho released in the mid-Columbia tributaries are expected to be similar.

Competition that results directly from the release of hatchery coho smolts would likely be negligible due to the fact that coho would be actively migrating downstream and therefore have limited time to interact with individual fish species. Implementing the following mitigation measures as appropriate would minimize the risk further:

- releasing coho smolts in low densities;
- avoiding or delaying releases in habitat for sensitive species (except when the point of the research is to test interactions with a specific species);
- releasing fish that more closely resemble sizes of wild coho, and
- waiting until smolts are ready to actively migrate before releasing them.

If the project moves to Phase 2 and stocking or natural production significantly increases coho densities, the risk of adverse competition effects could increase. However, this is not expected to occur during the timeframe of this EA, particularly because most returning coho adults would be collected as broodstock, so little natural production is expected during this period.

Residualism is the tendency of hatchery smolts to delay or avoid what would otherwise be normal outmigration in the spring. The spatial and annual incidence of residualism is typically highly variable. When fish residualize, they become a part of the stream-reared fish community, competing with resident fish for resources such as food and space, and becoming potential predators (or prey). Residualism for coho has received little study. Recent experience with mid-Columbia coho releases, however, shows that when researchers remove the barriers at coho acclimation sites, the fish leave quickly. The incidence of coho residualism is expected to be minimized through acclimation and volitional releases and would be monitored in both the Wenatchee and Methow basins through the proposed snorkeling surveys. Coho residualism is being studied in more detail in the Yakima basin. Whether the expected low residualism would continue with subsequent generations is more open to question and is expected to be the subject of future studies.

In sum, because coho released during the period covered by this EA are expected to migrate quickly and therefore limit the risk of competition with other species, broad geographical displacement and reduced survival of other salmonid populations is not expected.

Transfer of Disease

In general, artificially propagated fish are more prone to suffer from infectious diseases and parasites than their wild counterparts because they live under unnaturally crowded conditions where transmission of infectious agents is more efficient. In addition, hatchery rearing conditions and artificial diets may result in stress or nutritional imbalances that affect the physical condition of hatchery fish and their resistance to disease organisms. Among the normal suite of viral, bacterial, fungal and protozoan diseases known to infect salmonids in the Columbia River basin, the most important for coho are bacterial kidney disease (BKD) and "cold water disease." Concerns were raised during scoping for this EA that such diseases could be transmitted from hatchery-reared coho to wild fish of other species, thus increasing the incidence of infection among wild stocks.

The presumed risk is from two sources: first from hatchery coho smolts released into these locations and later, from adult fish returning to spawn. Upriver salmonids have been documented holding in the lower reaches of lower Columbia River tributaries where they may become exposed to infectious agents in that sub-basin and later show overt disease when they arrive at their upriver "home." Using genetic "fingerprinting" methods, researchers have documented the movement of strains of infectious agents within the Columbia River basin that are believed to be due to the migration of adult salmonids (Jim Winton, USFS, personal communication, 1999).

Because anadromous fish are already in the subject watersheds and because coho salmon are more resistant than steelhead or chinook salmon to the viral and bacterial pathogens of concern, the added risk from this source seems limited. Virtually all of the infectious diseases affecting

hatchery coho salmon in the Columbia River basin are thought to occur in wild fish or in the natural environment. Most Columbia basins have or have had the major diseases of concern. For example, BKD is prevalent in essentially all hatchery and wild stocks of salmonids in the Columbia River basin (Jim Winton, USGS, personal communication, 1999).

A recent literature review by Miller et al. (1990) found that, in spite of the comparatively high incidence of disease among hatchery stocks, there is little evidence that diseases or parasites are routinely transmitted from hatchery to wild fish. This review found a number of studies indicating that bacterial kidney disease was *not* transmitted from infected hatchery outplants.

"Cold-water disease" is a significant risk to coho, particularly in the higher-elevation tributaries of the Wenatchee and Methow basins. When water temperature in the hatchery falls below about 40° F, potentially lethal bacterial outbreaks can develop. The disease is treated using antibiotics, but it is not always effective. Because coho smolts and adults are less susceptible to this disease and because the causative bacterium is already free-living in the watershed, other salmonids in the basin would not be placed at significantly greater risk from this disease.

Hatchery-reared fish are prone, through proximity, to contract a variety of fungal, protozoan, and helminth parasites that are relatively easy to diagnose, and chemical treatment of the holding water normally is effective. Any potential risk of transmitting most internal and external parasites of salmonid fish from hatchery to wild situations would be confined to the brief period during outmigration and would therefore be limited.

All phases of broodstock development, fish transfers, and smolt releases would follow the fish health policy documented in *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (IHOT 1995). Rigorous sanitation and use of disinfecting procedures combined with optimum husbandry, isolation and quarantine practices and a strong diagnostic and therapeutic program would minimize fish health concerns and reduce any potential for adverse effects from disease transmission by released coho to a low risk.

3.3.2 Hatchery Releases Alternative

3.3.2.1 Genetic Effects

Artificial Selection

The potential to reduce in the broodstock existing levels of divergence from natural populations resulting from artificial selection likely would be lower than the Tribal or Phased Study alternatives because fish would not be acclimated in natural surroundings. However, as this is a long-term benefit of the program, domestication effects during the period covered by this EA would likely be about the same as in the Tribal and Phased Study alternatives.

Genetic Variability

The same IHOT breeding procedures would be used as for the other alternatives. The potential for problems of maintaining genetic variability would also be the same.

Straying

The potential for adult straying would be similar to the Tribal and Phased Study alternatives.

3.3.2.2 Ecological Interactions

Predation

The potential for direct predation could be less than the Tribal and Phased Study alternatives because, with one release site located lower in the basin, the spatial overlap with other species of concern (spring chinook and steelhead young of the year) would be more limited. In addition, the total number of coho released would be lower than for the Tribal and Phased Study alternatives, further limiting the opportunities for interactions with other species. Because no direct predation study is proposed, the specific risk to spring chinook is lower as well. However, because no monitoring of these effects is proposed, there is little risk protection.

The potential for indirect predation may be greater than the Tribal and Phased Study alternatives. Large masses of fish moving downstream at once might attract predators, but could also shield other salmonids from predators.

Competition

Even with larger numbers of coho released in one place, competition would, like the Tribal and Phased Study alternatives, not be significant because the coho would move out of the area quickly, and therefore any effects would be limited.

Transfer of Disease

The types of diseases to which the coho would be susceptible would be the same as described in 3.3.1.1. While the same IHOT protocols would be followed to reduce the potential for hatchery-reared fish to acquire disease, the potential might be greater than the Tribal and Phased Study alternatives because densities in hatchery rearing ponds are higher than in the proposal's natural acclimation ponds. Higher fish densities during rearing create greater stress and susceptibility to some diseases and greater potential to encounter diseased fish. On the other hand, any potential that exists to transfer disease to other species could be less than the Tribal and Phased Study

alternatives because fewer coho would be released and they would be released directly from the hatchery, which is located lower in the basin. Therefore the spatial overlap with non-migrating spring chinook and steelhead juveniles would be limited, and any potential to transfer disease to these fish would be reduced.

3.3.3 No Action

3.3.3.1 Genetic Effects

Artificial Selection

Under the No Action alternative, there would be no potential to reduce in the broodstock existing levels of divergence resulting from artificial selection. This is because Lower Columbia River stocks of fish would be bred and reared in lower Columbia River hatcheries, trucked to the mid-Columbia basins, and released, without acclimation in the mid-Columbia. However, during the period covered by this EA, the differences between this and other alternatives would be negligible.

Genetic Variability

The same IHOT breeding procedures would be used as for the other alternatives. The potential for problems of maintaining genetic variability also would be the same.

Straying

The potential for straying is much higher than for the other alternatives because the fish, having been bred and reared in lower Columbia waters, could be imprinted on those waters enough to return there to spawn rather than continue several hundred more miles up the Columbia River. Studies from the Yakima basin show that the number of adult fish passing McNary Dam (on the Columbia River below the Yakima system) that also passed Prosser Dam (on the Yakima) was significantly higher for acclimated fish (48%) than for non-acclimated fish (13%) (CTWSR et al. 1997).

3.3.3.2 Ecological Interactions

Predation

There could be some potential for direct predation because release sites are unknown; depending on how far up in the basin they are released, spatial overlap with other species of concern (spring chinook and steelhead young-of-the-year) could occur. However, no direct predation study is proposed, so the potential for direct take would not exist. However, because no monitoring of effects is proposed, there is little risk protection.

The potential for indirect predation would be similar to the Hatchery Releases alternative because of the large masses of fish moving downstream at once that may both attract predators as well as shield other salmonids from predators.

Competition

The potential for competition would be similar to the other alternatives because the coho would move out of the area quickly, and therefore any substantial effects would be limited.

Transfer of Disease

The potential to transfer disease would be similar to the Hatchery Releases alternative.

3.4 Effects of Hatchery Modifications, Acclimation Site Development and Facilities Operations

3.4.1 Proposed Action and Phased Study

Impacts of the Proposed Action and Phased Study alternatives would be similar; however, any hatchery capacity increases required to accommodate Methow basin releases would not be required under the Phased Study alternative.

Spawning, incubating, rearing, and releasing coho and collecting broodstock could take place in the following places:

Wenatchee River Basin (Figure 2)

Adult Capture—Adult broodstock collection could occur at Priest Rapids, Rocky Reach and/or Wells dams on the Columbia River (Figure 1); at tributary sites such as Tumwater Dam, Leavenworth National Fish Hatchery (at the dam on the side channel), and the Chiwawa River weir (Eastbank facility); and from stray adults returning to any of the mid-Columbia hatcheries.

Adult Holding and Spawning—Tentatively this would occur at the Entiat National Fish Hatchery, but it could occur at another facility.

Egg Incubation and Juvenile Rearing—This activity could occur at Winthrop, Entiat, Leavenworth, Turtle Rock, or other appropriate Federal, State, PUD or Tribal facility.

Acclimation and Release—Potential sites (Figure 2) are White River Side Channels (White River); Two Rivers (confluence of Little Wenatchee and White rivers); Butcher Creek and Swamp Creek (Nason Creek); Hatchery Side Channel or pond (Icicle Creek); and Beaver Creek. A maximum of three potential sites would be developed.

Monitoring—Juvenile migration monitoring would most likely incorporate the use of rotary traps located in the river/creek channel or in an irrigation diversion (i.e., Dryden) upstream of the fish screens. Electro-fishing and/or beach seining might be used as alternatives to trapping. Juvenile distribution/abundance monitoring would be done primarily through snorkel surveys.

Adult monitoring could occur at Rock Island and Rocky Reach dams on the Columbia River, at Tumwater and Dryden dams on the Wenatchee, and at the adult broodstock weir on the Chiwawa River. The potential exists to install remote underwater video camera monitoring systems.

Methow River Basin (Figure 3)

Adult Capture—Primarily Wells Dam but secondarily at Priest Rapids and Tumwater dams.

Adult Holding and Spawning—Winthrop NFH.

Egg Incubation and Juvenile Rearing—Winthrop NFH and/or Entiat NFH, or other appropriate Federal, State, PUD or Tribal facility.

Acclimation and Release—Existing sites (Figure 3) at Eightmile Creek Ponds (Chewuch River), Upper Methow River (Rockview Ditch), Biddle Ponds (Wolf Creek), and Winthrop NFH.

Monitoring—Wells, Rocky Reach, and McNary dams.

3.4.1.1 Hatchery Modifications

In order to study whether a locally adapted broodstock can be developed in the mid-Columbia basins, researchers suggest that coho for this project be bred and reared at mid-Columbia hatcheries rather than in lower Columbia hatcheries as they are now. Space available at existing mid-Columbia facilities would be used if at all possible. If all basin hatcheries are at capacity or otherwise unavailable, temporary facilities would be installed at an existing site.

If Winthrop National Fish Hatchery is used for coho broodstock development, the existing water supply would need to be increased in late spring/early summer 1999 to be able to rear 250,000 coho. Either the existing buried line from a ditch off the Methow River could be tapped, or a temporary pipe from the intake at the ditch could be used. In addition, if the hatchery is at capacity for rearing fish, portable, temporary raceways would be used for the coho research.

Potential effects of improvements at any hatcheries used for this study would be negligible because all work would be done within the confines of the existing hatchery properties. No new property would be acquired, so land uses would not change. The ground already has been disturbed at each site, so any excavation required is unlikely to uncover cultural resources. In the unlikely event that cultural materials are uncovered during construction, work in the immediate vicinity of the project would be halted, and the facility operators (e.g., USFWS in the case of Winthrop NFH) would consult with the State Historic Preservation Officer and a qualified archaeologist. BPA and the hatchery managers will ensure that any human remains encountered are treated in a respectful manner.

3.4.1.2 Hatchery Operations

For any of the hatchery facilities, downstream water users, including irrigators, probably would not be affected by increased withdrawals or discharges because water is passed through the system and discharged in the same amounts. The increased production is expected to fall within the operating limits of existing water rights. However, in the event operating limits could be exceeded, the additional water right would be obtained from WDOE before proceeding.

Depending on which facilities are used, discharge permits (NPDES) from the State of Washington may need to be modified for the increased production.

Adding coho production to existing facility operations would increase the amount of waste products, primarily fish feces and unconsumed fish food. Most of the fish wastes settle to the bottom of the rearing tanks and raceways, with a small percentage remaining suspended and discharged. Through routine cleaning practices, waste products accumulating in rearing structures are pumped to the facility settling basins. The basins detain raceway cleaning effluent and allow fish wastes to settle out of the water column. Wastes that accumulate in the settling basins degrade naturally, but might require more frequent periodic removal and disposal (normally every 5 to 10 years) with the additional production. Depending on current hatchery practices, this waste material might be offered to local farms for agricultural fertilizer, or applied to facility land. It could also be placed in a certified landfill.

Carcasses of any returned spawned adult fish must also be disposed of seasonally. Most hatcheries make specific disposal arrangements annually. Depending on a particular hatchery's practices, fish carcasses might also be incorporated into local composting programs or used as fertilizer, rather than disposed of by conventional means.

Fish carcasses also could be left in or returned to the river. Adding carcasses can be a benefit to some aquatic species by increasing the nutrient levels in streams, and perhaps to bears, which feed on spawned fish. However, in hatchery programs, fish to be spawned are injected with an anti-bacterium to keep them disease-free, so care would need to be taken to keep injected, diseased carcasses out of the stream.

The addition of coho production to operations at any hatchery might require the increased use of several chemicals classified as medicines for fish disease prevention and control, including formalin (a saturated formaldehyde solution). Formalin is used at hatcheries to control disease and fungus outbreaks in fish. It is used in small enough amounts that it does not harm the fish in the hatchery, and the discharge of water containing it into streams is controlled by a National Pollution Discharge Elimination Permit to avoid potential effects on biota in the receiving stream. In addition, MS-222, an anesthetic, is used primarily during transport of fish or when taking measurements (see section 4.5, Analytical Methods). MS-222 would be used in accordance with U.S. Food and Drug Administration (FDA) requirements to calm fish and reduce stress.

These chemicals are already part of most normal hatchery operations. Only formalin is considered a potentially dangerous waste. The formalin would be considered a listed hazardous waste as formaldehyde. Project facilities must comply with the dangerous waste generator requirements of WAC 173-303-070(8) if it becomes necessary to dispose of more than 1 kilogram (2.2 pounds) of formaldehyde at one time. Because coho production is not expected to add significantly to formalin use and is normally used up by a hatchery during operations, the potential coho production facilities are not expected to be classified dangerous waste generators as a result of this project.

Several compounds routinely used at fish hatcheries, including formalin, are listed in 40 CFR 302 as requiring a report to be filed with the National Response Center within 24 hours if a spill above a certain amount (or reportable quantity) occurs. The addition of coho production to any of the existing hatcheries is not expected to increase the spill potential of any of these

compounds, most of which are not stored at hatcheries in quantities that would be reportable if spilled.

Chemicals used for this project would be handled, applied, and disposed of in accordance with FDA, EPA, and the Washington Department of Ecology (WDOE) regulations. Consequently, adverse environmental effects from chemical use at project facilities are not anticipated.

3.4.1.3 Development and Use of Acclimation Sites

Figures 4 and 5 show a typical acclimation site. Existing ponds or canals would be used wherever possible. The purpose of acclimation ponds is to help hatchery-reared juvenile fish begin to adapt to the natural environment. Coho would be trucked from the hatchery to the ponds as pre-smolts and allowed to acclimate in the ponds. Temporary barrier nets would be placed at the inlets and outlets to the ponds. The nets are tied to trees on the banks, or are anchored with rebar, sandbags, concrete blocks, or heavy chains. They remain in place from about mid-March to mid-June. In other cases an outlet structure with a screen and water level controls such as **damboards** may be used. When it is clear to researchers that the fish are ready to begin their downstream migration (they have reached optimum smoltification), the barrier between the ponds and access to the main river or creek is removed, and the smolts exit when they are ready. Impacts of releases are discussed in section 3.3.

Methow Basin Sites

Acclimation ponds were developed in the Methow basin (Figure 3) for use in spring 1998. Their development was categorically excluded from NEPA evaluation because it occurred before fish species were listed as threatened and endangered in that basin. No new development would be required there. Temporary water rights that were granted for previous years' operations would need to be renewed. The minor impacts of operations, as described below for the Wenatchee basin sites, would be similar to those that have previously occurred in the Methow basin. One site, the Rockview Ditch, has not yet been used, but only temporary nets would need to be placed, so adverse impacts are not expected.

Flood potential at Methow basin sites is low. The property owner has not observed flooding in more than a decade at Biddle Pond, and the other two sites are not susceptible or are susceptible only during major events. The low potential for increased predation due to premature release of smolts during a flood, as described for Wenatchee Basin Sites below, would likely be even lower in the Methow because there are fewer opportunities for predation by coho on sensitive species; and because no releases would be made in the Methow in 1999, which could be a high water year.

FIGURE 4

TYPICAL COHO ACCLIMATION SITE

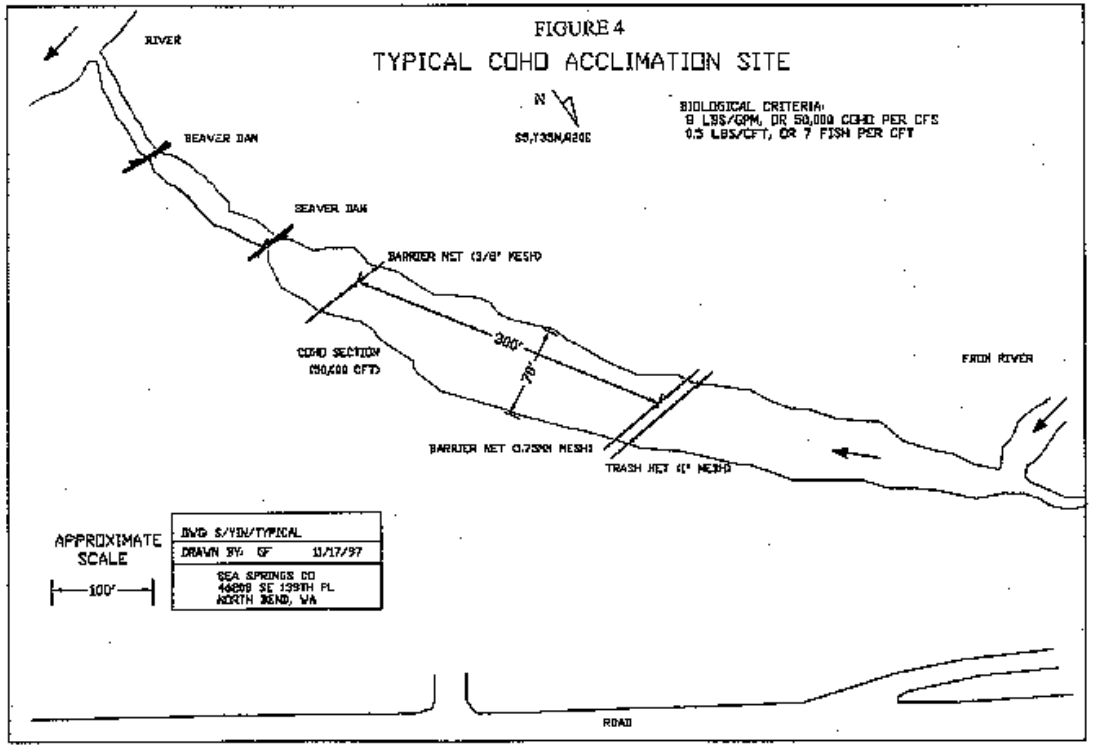


Figure 5: Top Photo -- Swamp Creek site; Bottom photo -- White River Side Channel site

Photos Not Available

Wenatchee Basin Sites

Six sites are proposed for the Wenatchee basin which require varying levels of development. They are (Figure 2):

- Hatchery Side Channel or pond (Icicle Creek);
- Butcher Creek (Nason Creek);
- Swamp Creek (Nason Creek);
- White River Side Channels (White River);
- Two Rivers (near where the Little Wenatchee and White rivers enter Lake Wenatchee);
- Beaver Creek.

Only two sites are proposed for use in 1999—Leavenworth Hatchery pond and Swamp Creek. One or more of the remaining four would be developed in 1999 for use beginning in 2000. Some resource impacts and permitting processes are similar for most or all of the proposed new acclimation sites; they are discussed below under "**General Impacts**." Other impacts are site-specific, because the resources and amount of development at each site are different. These impacts are discussed under "**Site-Specific Impacts**."

General Impacts

Land Use. Most of the proposed sites in the Wenatchee basin use existing ponds or waterways. Only one (Two Rivers) would convert land to ponds, and the site would use less than 0.8 hectare (2 acres) of land. All new ponds proposed for the project would be earthen-lined; no concrete would be used. New roads would not be needed, nor would existing roads need to be upgraded.

Water use. Temporary water rights would need to be obtained from the WDOE for one of the sites—Two Rivers. These water rights are for approximately two months annually (end of March to June 1) when flows are well above optimum levels. As long as the water intake and outfall are close to each other, the permits are rated non-consumptive because all water diverted through an acclimation pond is returned to the source. Irrigators are unlikely to be affected because flows normally are high enough during that period to supply their needs as well as those of the fish. All water rights would be obtained before the new ponds are developed. Water temperatures of the source streams and rivers would not be increased by returns from the ponds because use occurs during spring when water temperature is cold and flows are high.

Wastewater. Because the net biomass increase for each acclimation pond is less than 9,091 kg (20,000 lbs.), a National Pollution Discharge Elimination System (NPDES) permit generally is not required under Washington State environmental law as administered by WDOE.

At each site, a technician, residing in a trailer, would feed the fish in the acclimation pond and monitor their condition. The trailer would be self-contained, so no wastewater would be discharged at the site.

Ownership. The Hatchery Side Channel and pond are located on land owned by the USFWS. Butcher Creek, Beaver Creek, and Two Rivers are on private property. The Swamp Creek site is located on USFS land. Depending on final location and design, the White River Side Channel site could be on either USFS or private land. Permission to develop and use these sites must be obtained from those owners before work is done. A land use permit would be required from the USFS before sites on USFS land could be developed or used. Depending on the level of development, the USFS could require a site-specific design; could require surveys for all listed plant and wildlife species, for "Survey and Managed Species" defined in the Northwest Forest Plan (USDA FS/USDI BLM 1994), and for cultural resources; might prepare its own NEPA document; and would consult with NMFS and USFWS before a permit would be considered.

Recreation/Visual Resources. The Wenatchee basin is popular for a variety of recreational uses including boating (rafting, kayaking, canoeing), hiking, mountain biking, skiing, and snowmobiling, to name only a few. Because all proposed acclimation sites are on side channels or in backwater areas rather than on mainstem creeks or rivers, recreational boaters would not be affected. No sites would adversely affect proposed or candidate Wild, Scenic, or Recreational rivers. (See also discussion of Hatchery Side Channel and pond and White River Side Channel sites.) Recreational users of nearby areas, whether on land or water, are unlikely to notice the nets or other barriers. Roads to a few sites, including the USFS road to the White River Side Channels, may need to be plowed in the early spring to facilitate access by researchers, but none are designated snowmobile or ski trails. However, the USFS road is used by a few residents, snowmobilers and cross-country skiers, who might prefer the road unplowed. If so, alternative modes of access that would not require the road to be plowed might be used.

National Trails, Wilderness Areas, National Parks, or other specially designated areas would not be affected.

In sum, adverse impacts to recreational users near any of the proposed acclimation sites are not expected.

Sensitive Plants. Five sensitive plant species were identified in the project area: Wenatchee checker mallow, Wenatchee larkspur, Ute ladies tresses, *Carex interrupta* (a sedge), and Showy stick-seed.

Of the five, two have potential to be affected by project activities. The Wenatchee (Oregon) checker-mallow (*Sidalcea oregana* var. *calva*), is classified as Proposed Endangered under ESA. It is found in the Leavenworth Ranger District in dry forest and moist meadows, and at stream margins generally within ponderosa pine forest. It is associated with Wenatchee larkspur (*Delphinium viridescens*)--a USFS species of concern--and quaking aspen in moister sites. This habitat would be similar to that associated with the proposed acclimation sites.

The Showy stick-seed (soon to be proposed for listing) is found in Tumwater Canyon on steep, gravelly slopes (Ken MacDonald, USFS, personal communication, 1999). However, none of the sites are near the canyon, and they would all be located in level terrain, so this plant species is unlikely to be affected.

The Ute ladies tresses is listed as Threatened. Although it has been found in the Okanogan in a similar climate zone, it has not been found on the Wenatchee National Forest (Ken MacDonald,

USFS, personal communication, 1999), where all the proposed new acclimation sites are located. Therefore, the Ute ladies tresses is not expected to be affected.

The USFS reports some Regional Forester's Sensitive Plants (*Carex interrupta*) in the Swamp Creek area, but these would not be adversely affected because no ground disturbing activity would take place at that site.

At five acclimation sites, impacts to vegetation are not expected due to the limited and temporary nature of the development. At one site (Two Rivers), pond and/or channel construction could destroy some vegetation. This site will be surveyed for the presence of sensitive species before ground-disturbing work begins. If sensitive species are found, the site would not be developed or would be moved to avoid impacts.

Floodplains. Under Executive Order 11988, Federal agencies must avoid or minimize adverse impacts associated with short-term or long-term modification and occupancy of floodplains. Modification and destabilization of the floodplain could have potentially adverse effects not only near the disturbance, but also in the stream channel and floodplain downstream. Adverse impacts could include increased potential for erosion of floodplain soil and sediment near the sites.

All sites but the Hatchery Side Channel/pond are in 100-year floodplains. Effects on floodplains, and the flood potential at each site, are described under "Site-Specific Impacts" below. In general, however, because only the Two Rivers site proposes any ground disturbing activity, effects on floodplains are not expected at the other sites.

The primary concern with the flood potential at each site is that coho smolts could be released prematurely, with the potential for increased predation on other species. Most sites would not be at risk of flooding, and thus prematurely releasing smolts, except during major flood events. However, the White River site in the Wenatchee basin is supplied directly with water from the river, so it is susceptible to flooding in moderate flows. An additional risk is that this site is upstream from sockeye rearing habitat in Lake Wenatchee, so during a flood, coho smolts would pass through this area, increasing opportunities for predation on sockeye. On the other hand, high water moves the fish quickly, and as discussed in section 3.3.1.2, stomach analyses of coho captured during high water in the Yakima River fall chinook study show no predation on other salmonids. If the White River or Two Rivers sites are used, coho predation on sockeye would be monitored at the screw trap below Lake Wenatchee.

Flood risks in 1999 could be higher than usual due to the year's heavy snowpack. The Swamp Creek and Leavenworth pond sites, proposed for use in 1999, have a relatively low risk compared to other sites. The Leavenworth site is in a somewhat controlled environment. At Swamp Creek, water does not flow into the site, so the main risk would be from backup into the site from exceptionally high flows in Nason Creek.

Wetlands. Most if not all the proposed acclimation sites are likely to be in wetlands. However, only work at the Two Rivers site would create enough disturbance to potentially adversely affect wetlands and to require a Section 404 Permit from the U.S. Army Corps of Engineers (Corps). Exact wetland locations would be delineated before final siting and construction. If this site is found to be in wetlands, the following measures would be taken.

To avoid impacts on wetlands at acclimation sites, information from delineation surveys would be used during final design to develop mitigation measures, if necessary, to ensure that the project would result in no net loss of wetlands. Review and concurrence through the Corps' permit process would be completed as necessary before site development. Disturbance of wetlands would be avoided whenever possible. Buffers from construction activities would be provided. If disturbance could not be avoided, the area of disturbance would be minimized to the extent practicable. Upon completion of construction, disturbed land would be restored to its previous condition wherever possible.

Wildlife. The project area supports a variety of wildlife that inhabits forested and riparian areas. Species include several considered sensitive, including species listed as Threatened or Endangered under ESA: Bald eagle, peregrine falcon, northern spotted owl, marbled murrelet, grizzly bear, and gray wolf (in addition to the fish species discussed in section 3.3.1.2). Development work proposed could temporarily disturb species occupying areas at and near acclimation sites, but because habitat would not be destroyed and the project would not increase long-term human use of the areas, no wildlife, including sensitive species, are expected to be adversely affected (BPA 1999). See also discussions under Butcher Creek, White River Side Channels, and Two Rivers sites.

Development and use of the acclimation sites would not likely impact the growth, relative distribution or abundance of endangered, threatened, or sensitive species in the mid-Columbia region. Although development of the Two Rivers acclimation site would require some ground disturbance, only minor amounts of in-stream sediment would be produced for a short time during construction.

Any sediments produced by development of acclimation sites would not adversely affect bull trout redds because the spawning areas for bull trout in the Wenatchee basin are upstream of proposed acclimation sites. Although some spawning areas for other sensitive species could be downstream of the Two Rivers acclimation site where digging would be required, work would be timed to avoid spawning, coffer dams would be used to minimize sedimentation, and no trees would be removed from riparian areas.

Site-specific impacts

Hatchery Side Channel or pond. The side channel at Leavenworth NFH is actually the original channel of Icicle Creek. In 1939-1940, as part of the Leavenworth Hatchery construction, a bypass channel was constructed and the original channel was dammed off at both the upper and lower ends. The original channel was used to hold adults prior to spawning, but also has been used for other studies. The USFWS has not used it for several years. The dams at either end of the channel are designed to allow control of the flow through the channel, and can be modified to allow fish passage both into and out of the channel. In the past, a few salmonids—spring chinook, bull trout, and a very few steelhead—have used the channel to reach spawning areas further upstream (G. Pratschner, USFWS, personal communication, 1999).

A temporary smolt screen would be added to the existing water control structure. Water would be supplied from an existing structure. Dredging of the channel is being undertaken by other entities for a different project and could result in a minor, temporary increase in sedimentation downstream of the work. However, development undertaken as part of the Mid-Columbia Coho Reintroduction Feasibility Project would not disturb the natural environment.

An alternative would be to acclimate coho in an existing pollution abatement pond at the hatchery. No changes would be needed at the hatchery to use this pond for acclimation. This is proposed for 1999. However, the pollution abatement pond is considered a poor substitute for the side channel because the water has already been run across fish two or three times and thus is high in ammonia from fish excrement and low in oxygen, making for a less than suitable rearing environment for pre-smolts.

The Wenatchee National Forest recommends that Icicle Creek in this area be classified as a Recreational River under the Wild and Scenic Rivers Act, and the Forest manages the river to preserve the values that support that classification. Installation of a temporary smolt screen and use of the channel for fish acclimation would not adversely affect the recreational and other values of Icicle Creek.

A local interest group has proposed to USFWS that the dams and other structures in the channel be removed altogether, to restore the channel and allow full access to it by fish for spawning and rearing habitat. That proposal is the subject of an environmental process currently being launched by the USFWS and USFS. They expect to issue a Notice of Intent to prepare an Environmental Impact Statement on the proposal in the near future.

The use of the side channel for acclimating coho as proposed under the Tribal and Phased Study alternatives would not interfere with either allowing fish passage through the channel, or with the proposal to remove the dams. In discussions with YIN and USFWS, it was agreed that the coho acclimation would be accomplished in a manner that would not block the channel to migrating fish. If the decision is made to remove the dams and other structures, either the coho acclimation would remain at the hatchery pond, or provisions would be made to allow acclimation under the new conditions. Nothing in this proposal would preclude or prejudice the outcome of the USFWS EIS on restoring the habitat of the Icicle Creek channel.

Although Federal Emergency Management Agency (FEMA) maps show the hatchery outside of the 100-year floodplain boundary, site personnel indicate the area is still subject to flooding during major high water events, despite the control dam. Consequently, some risk exists, although it is likely low given the channel and pond's proximity to the hatchery, that smolts could be prematurely released during a major flood. However, because few spawning areas for sensitive species exist downstream of the hatchery, and because high water would likely move the fish downstream quickly, the risk of increased predation by coho on sensitive species is low.

Butcher Creek. This site, just off Highway 2, is an existing beaver pond. Water would come from Butcher Creek. A smolt exit pipe approximately 5 centimeters (12 inches) in diameter would be installed through the beaver dam using hand tools, to provide smolt access to Nason Creek for their downstream migration. A temporary net would be placed upstream of the dam until smolts were ready to migrate.

The beaver is one of two species (the ruffed grouse is the other) selected by the Wenatchee National Forest as the management indicator species for riparian habitats[7]. The beaver could be disturbed while the pipe is being installed, but the primary effect would be that the water level behind the dam might be lowered slightly. If this happens, the beaver might try to build the dam higher to raise the water level, but the animal would not likely leave the area permanently, nor would its survival be threatened.

The site is in a 100-year floodplain, parts of which are classified as subject to shallow flooding (between 0.3 and 1 m [1 - 3 feet]); but the site is subject to flooding only during major events. Risk of premature release of smolts is low. The site is also a wetland. Floodplain and wetland characteristics would not be changed by use of this site as proposed.

Beaver Creek. The coho would be acclimated at this site in an existing, privately-owned pond adjacent to a tributary to the Wenatchee River called Beaver Creek. It is approximately 0.4 km (0.25 mi.) northeast of Plain, just off of Highway 209 and just south of the confluence of the Chiwawa and Wenatchee Rivers. It is a man-made pond with a diversion from Beaver Creek and a culvert discharge back to the creek. The only work required at the site would be to place a temporary net upstream of the culvert to hold the smolts until they are ready to migrate.

Impacts at this site would be minimal. The Beaver Creek site may be located in a 100-year floodplain and wetlands. As with Butcher Creek, floodplain and wetland characteristics would not be changed.

Swamp Creek. This site is about 1.6 km (1 mi) north of Coles Corner on the road to Lake Wenatchee. It is an existing side channel of Nason Creek that was formed by the highway. Springs and seeps supply water. A culvert under the road connects the wetland and side channel to the main creek. The only work that is required at this site would be to place a temporary net upstream of the road culvert until the smolts are ready to migrate**.** Although the site is in a 100-year floodplain and is a wetland, development and use of the site as proposed would not change floodplain or wetland characteristics or values. Flood potential is similar to Butcher Creek. There are some Regional Forester's Sensitive Plants (*Carex interrupta*) in the Swamp Creek area but they would not be adversely affected because no ground disturbing activity would take place. A permit to use the culvert might be required from Washington Department of Transportation.

White River Side Channels. This site, on existing side channels of the White River, is approximately 2.4 km (1.5 mi) south of the Nepeequa Crossing Campground. Water is supplied to the site naturally by the White River. Similar to the Butcher Creek site, the only work required would be to place a temporary net upstream of the main river until the smolts are ready to migrate, and to place a smolt exit pipe through a beaver dam. Impacts of this activity would be similar to the Butcher Creek site.

The site is in the Sears Creek area which the USFS has designated in the Grizzly Bear Recovery Plan as potential grizzly spring emergence habitat, although the area is not currently used by bears. Plowing the Sears Creek road to the acclimation site could increase the potential for

[7] Management indicator species are species whose population parameters appear to show the effects of land management practices on specific types of wildlife habitat (USDA FS 1990).

disturbance of any bears that might use the area. To reduce the potential for impact, a gate would be placed across the road to prevent increased access to the site.

The Forest Service designated the White River in this area as eligible for inclusion in the Wild and Scenic Rivers system as a Recreational River. It is being managed to preserve the resource values that support that designation. The site is also in a 100-year floodplain and probably a wetland. However, because of the temporary nature of the modifications required at this site, the work would not adversely affect the recreational and other values of the White River or the floodplain/wetland characteristics and values.

As described under "General Impacts - Floodplains" above, this site is subject to flooding during moderate flows, so the risk of premature release of coho smolts is somewhat greater than for other sites. If this site is used, predation on sockeye rearing in Lake Wenatchee would be monitored.

Two Rivers. This site, near where the Little Wenatchee and White rivers enter Lake Wenatchee, is on the property of an operating sand and gravel mine (Two Rivers Sand and Gravel). Ponds would be constructed in an already mined area using a bulldozer and backhoe. Shallow depressions to groundwater level also would be dug, from which water would be pumped (using a temporary pump) to supply the ponds. Both the acclimation and water supply ponds may be lined with plastic if they won't hold water without it. A channel up to 150 meters (500 feet) long would be dug from the ponds to the Little Wenatchee River to provide an exit for the smolts.

The site of the proposed ponds has already been disturbed and cleared of vegetation. The exit channel, however, would disturb or destroy riparian and/or wetland vegetation for a distance of about 80 meters (260 feet). Plant surveys would be done before ponds and channels are designed and constructed to determine if any sensitive species occupy the area. If any sensitive species are found, the areas would be avoided.

The site is in a 100-year floodplain and the channel probably would be in a wetland. The sand and gravel company's operating permit does not allow disturbance within 76 m (250 ft) of the river. Permits to work in wetlands and shoreline areas could be required (see section 4.7). County authorities would be contacted to ensure that the construction would not alter floodplain or floodway characteristics or channel flow capacity. Certain design restrictions or limitations could apply. Ensuring that construction would not raise the expected level of the 100-year flood and would not include use of impervious surfaces would mitigate construction impacts within the 100-year floodplain. Sediment levels in the Little Wenatchee River would be unlikely to increase noticeably while the channel is being dug because no water would be flowing in the channel during the digging, and a temporary coffer dam using sandbags would be used at the outlet to the river to prevent sediment from entering the river. The site would be designed so runoff from the site after construction would not enter the channel. There are no large hills of gravel or dirt immediately adjacent to the proposed pond site at Two Rivers, and a berm protects the river from the excavation site.

Before designs are finalized, specific wetland locations would be delineated. The following measures would be taken, when practicable, to assure minimal impacts to wetlands.

1) In shoreline areas, disturbed land would be restored as closely as possible to pre-project contours and replanted with native and local species. However, site topography could require riverbank disruption. A restoration and monitoring plan would be prepared before shoreline areas were disturbed.

2) Erosion control measures would be implemented within the 60-m (200-ft.) State Shoreline area (see section 4.4.2).

Also see discussion "General Impacts - Wetlands" above.

The area floods only during major events. However, as described under "General Impacts – Floodplains" above, if such an event were to occur, there is a slight potential to increase predation on sockeye rearing downstream in Lake Wenatchee, although coho would likely be moved through the area quickly in the high water. Predation on sockeye would be monitored.

Because the pond site has been disturbed already, cultural resources are unlikely to be affected. A cultural resources survey on the channel area would be done before ground-disturbing work takes place. If cultural resources are found during the survey or during construction, procedures set forth in relevant regulations and guidelines would be followed (see section 3.4.1.1 and 4.6).

Noise from construction vehicles and operation of the pump would be temporary and unlikely to be more disturbing to wildlife or nearby visitors than that from the sand and gravel operation itself.

3.4.2 Hatchery Releases Alternative

Less rearing capacity is likely to be required at existing hatcheries compared to the Tribal or Phased Study alternatives. If additional capacity is needed at existing facilities, they would be temporary. As a result, impacts of hatchery modifications and operations would be the same or less than those described in sections 3.4.1.1 and 3.4.1.2.

Because off-site acclimation ponds would not be used under this alternative, no impacts would occur from their development or use in the Wenatchee and Methow basins.

3.4.3 No Action

Coho currently are being bred and reared in lower Columbia River hatcheries to meet requirements under *U.S. v. Oregon*. As a result, no modifications to hatcheries either in the mid- or lower Columbia would be required. Because off-site acclimation ponds would not be used under this alternative, no impacts would occur from their development or use in the Wenatchee and Methow basins.

3.5 Effects of Monitoring Activities

Monitoring activities include marking fish to track their migration and survival; trapping or otherwise collecting fish for measurement and for genetic and direct predation analyses; and surveying habitat. The primary impacts of concern are those to existing populations of other fish species and to other resources in each basin. While researchers would attempt to minimize impacts to coho because the point of the research is to see if coho can survive and reproduce in the mid-Columbia, the coho are research fish; some portion of the introduced population must be sacrificed in order to accomplish certain studies. Because no natural or hatchery-produced populations of coho exist in these basins, the research activities would not adversely affect an existing coho population.

3.5.1 Proposed Action and Phased Study Alternatives

Tracking Methods

Electronic methods are used to track fish to determine movement, distribution, and habitat use by life stages for individual fish, both juvenile and adult. These marking techniques are standard in fishery science.

PIT Tagging: A Passive Integrated Transponder (PIT tag) is a tiny microchip inserted into the abdominal cavity of a fish that allows identification of individual fish. Up to 7,000 fish annually in the Wenatchee, and 8,000 annually in the Methow, would be PIT tagged. The information would be used to estimate survival rates of smolts as they migrate through the system. While these devices do not appear to negatively affect fish movement, some studies indicate that up to 20% of fish marked in this way die, primarily from the stress caused by handling (Prentice et al. 1994).

PIT tag detection will occur at existing dams and facilities. No new facilities would be needed.

Radio-telemetry: Radio transmitters are attached in the gullets of returning adult fish. Up to 100 adults in each basin would be marked at Priest Rapids, Tumwater, and/or Dryden dams (Wenatchee) and at Wells Dam (Methow). The transmitters have little effect on the feeding behavior of returning coho because the fish don't feed while in the spawning stream, and they die after spawning. However, several studies have indicated that adult salmonid mortality due primarily to handling stress may range from 10-15% (Hockersmith et al. 1995; Hockersmith et al. 1994). The marked fish will be followed either on foot, in vehicles, or from the air, or by using a fixed detector at a dam (e.g., Tumwater), to identify spawning locations.

Collection Methods

Methods used to collect fish for analysis purposes include screw traps, electro-fishing and beach seining. Their effects are described below.

Screw traps: A screw trap is a floating rotary trap used to trap juvenile fish moving downstream. Trapped coho would be measured for length and weight and examined for other characteristics. Other fish caught in the traps would be released immediately. Up to 6,000 captured coho would be sacrificed to examine their stomach contents for evidence of predation on other fish. (See "Analytical Methods" below.)

Up to three screw traps would be placed in the Wenatchee basin (no direct predation studies are proposed in the Methow). Sites would be near acclimation ponds, as agreed to by project participants.

The traps are anchored by a wire to some stable object, such as a tree, on either side of the river or stream. The traps will be in place from April 1 through July 31. Although some sampling would occur during the day, most activity would take place at night between approximately 11 p.m. and 3 a.m., when the fish are most actively moving.

Because one of the primary goals of the research is to study predation on spring chinook, an endangered species under ESA, at least one trap would be sited in known spring chinook habitat. As a result, of the species listed or proposed for listing, spring chinook are most likely to be caught in the traps. A few steelhead and bull trout might also be caught, as well as other, less sensitive species. Summer/fall chinook are not expected to be affected because they tend to spawn and emerge downstream of coho release areas.

Potential impacts to fish include predation by one species on another if too many fish are kept in the livebox too long before being processed; and injury to fish from river debris that may lodge in the trap. Traps will be monitored hourly, if not constantly, to minimize overcrowding in the livebox and its consequent predation, and to remove debris. Therefore, adverse effects on listed or proposed Threatened and Endangered species, including spring chinook, bull trout, and steelhead, are expected to be minimal.

Although the risk to listed species is expected to be low, the potential for harm requires that a Section 7 consultation for a permit for an "incidental take" must be obtained from NMFS under ESA. Such a permit would be required for spring chinook, bull trout and steelhead, and would specify the number of fish of each species that may be "taken" by the project. BPA and project proponents currently are consulting with NMFS to define the allowable take.

Traps also are an obstacle to recreational boaters such as rafters, kayakers, and others, who must pull their craft out of the river to get around the traps. Sites for traps could be on Nason Creek and at an existing trap operated by WDFW about 0.9 km (0.5 mi) below Lake Wenatchee. Anchor wires on the traps would be flagged to warn boaters of their presence.

Electro-fishing: This technique would be used as an alternative collection method for direct predation studies in the Wenatchee basin if screw trapping fails to collect enough fish. Up to

6,000 coho would be collected. The sampling would be conducted weekly between April 1 and July 31.

Fish within the sampling area are stunned by an electric current and float to the surface, where they are collected with a net. This technique, like screw trapping, poses a risk to non-target fish, and if done by inexperienced personnel, could injure or kill fish. To reduce the potential for fish mortality, only personnel trained in electro-fishing techniques use this technique. They would follow guidelines for such procedures recently established by NMFS (NMFS 1998). The sites sampled would be near acclimation ponds.

Beach seining: This technique also would be an alternative collection method to screw trapping. Fish are encircled by and then drawn into a large net deployed from a beach; coho would be removed immediately for analysis, while other species would be released. Potential mortality to fish from use of this technique is very low; stress from handling and de-scaling is the primary effect.

Analytical Methods

Fish measurements: All coho captured at screw traps (or using alternative methods), would be removed from the stream and measured to obtain life history data and to help determine survival rates. Other species, including species listed under the ESA, if captured would be returned immediately to the river. MS222 will be used to anesthetize coho. Using standard field techniques, coho removed for measurement are generally out of the stream no more than 15 minutes to half an hour. After the fish are anesthetized, measured and weighed, researchers ensure the fish are swimming well in a recovery bucket before releasing them to a quiet area of the stream. Risk of injury or mortality to the fish during handling is minimized by using experienced, technically qualified people to measure the fish.

Coho stomach analysis: Up to 6,000 coho smolts would be captured in screw traps in the Wenatchee Basin and their stomach contents analyzed to determine what they are eating. Of particular concern is whether they prey on spring chinook, because it is the sensitive species in the basin at greatest risk from coho reintroduction (see section 3.3.1). The coho must be killed in order to perform this research. The 6,000 smolts represent approximately 0.6% of the coho smolts that would be released into the Wenatchee basin. As these fish are considered research fish, this is not considered an adverse effect. Once analyses are complete, carcasses would be disposed as described in section 3.4.1.2.

Genetic sampling: Up to 240 fish would be either adipose fin-clipped or sacrificed for genetic studies. Clipping the adipose fin is done on juveniles. It is a standard research technique and results in minor stress to the fish from handling. Fish sacrificed for genetic studies would be returning adults and would die anyway after spawning. Once analyses are complete, carcasses would be disposed as described in section 3.4.1.2.

Survey Techniques

These techniques are used to count and describe spawning redds and to determine how quickly coho leave release areas. The only effect of these activities is a temporary, minor disturbance of fish in the area.

Redd counts: These surveys would be done basin-wide in the Wenatchee and Methow basins, but would be concentrated near release areas. Researchers would use rafts or walk in streams.

Snorkeling: These surveys would be spot checks near release areas in both basins. Sites would be selected randomly from 3 km (2 mi) above the release sites to the confluence with the Wenatchee River.

3.5.2 Hatchery Releases

Impacts would be the same as for the Proposed Action except there would be no effects of radio-telemetry, screw traps, or redd counts. Snorkeling surveys may be more intensive than for the Proposed Action and Phased Study alternatives but would not increase the minor level of impact.

3.5.3 No Action

Because no monitoring would take place under this alternative, the minor impacts of those activities would not occur.

3.6 Cumulative Fishery Resource Impacts

Regulations implementing NEPA require Federal agencies to consider the cumulative impacts of their proposed actions (40 CFR § 1508.25(c)(1991)). The regulations define cumulative impacts as follows:

"The impact on the environment which results from the incremental impacts of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." 40 CFR § 1508.7 (1991)

Only cumulative impacts to fishery resources are evaluated. Changes to the physical environment from proposed actions, even in combination with other activities, are too minor to have either significant adverse or beneficial effects because only 0.8 hectares (2 acres) of ground would be disturbed for all the potential work required under the most ground-disturbing alternative.

3.6.1 Releases of Coho in Combination with Releases of Other Species

The *Impacts of Artificial Salmon and Steelhead Production Strategies in the Columbia River Basin Draft Programmatic Environmental Impact Statement* (USFWS 1996) addresses cumulative impacts of all Columbia River basin hatcheries on naturally spawning stocks migrating in the Columbia River mainstem. While a final EIS has not yet been issued, nor a

decision reached, the mid-Columbia coho project is not expected to have adverse cumulative effects or to influence the outcome of the Programmatic EIS. BPA believes that the mid-Columbia coho project can and should move forward ahead of the final Programmatic EIS because it meets the criteria in 40 CFR 1506.1 (c).

- The mid-Columbia coho project is independently justified because it is a modification of an existing hatchery program that would, through research, help to answer many of the concerns and issues surrounding the re-establishment of extirpated coho stocks. There are no naturally produced stocks of coho left in the mid-Columbia that would be impacted by these studies, and the results of the studies would aid in determining the impacts of a coho reintroduction program on other anadromous species at risk.
- The cumulative impacts of the project on Columbia River Basin fisheries are addressed in this environmental assessment.
- The project would not prejudice the ultimate decision on the Programmatic EIS because it is a phased, research-level study utilizing relatively low-cost, temporary facilities that are not meant to be permanent and that could easily be adapted to conform with the ultimate programmatic decision.

While this EA specifically addresses the impacts of the program, it includes the following cumulative impact analysis that considers the impacts of this program on the overall Columbia River Basin fishery. The cumulative impact issues that have been raised regarding artificial production of fish in the Columbia River Basin include the following:

- The impacts of large numbers of hatchery fish on naturally-spawned fish in the Columbia River migration corridor, the estuary, and the ocean;
- Genetic fitness impacts on existing natural fish populations; and
- Harvest impacts on natural fish populations.

3.6.2 Migration Corridor Impacts

Questions have been raised as to whether the addition of coho smolts to the Wenatchee and Methow River basins would impact other anadromous smolts as they migrate together to the ocean. The maximum number of coho smolts proposed to be released under this project is 1,400,000, which is only about 0.7% of the total number of hatchery anadromous fish smolts released in the Columbia River basin each year (approximately 197,000,000). The 1.4 million coho smolts are about 4.8% of the total number of hatchery coho to be released in the Columbia River basin in 1999 (29,400,000). Coho have been produced and released from lower river hatcheries for many years. This program would merely result in the movement of fish normally released from these lower river hatcheries to the mid-Columbia for release instead. Therefore, the project fish would not raise the total number of fish migrating through the lower Columbia River, and would not cause increased impacts in estuary or nearshore habitats. They could create new opportunities for adverse ecological interactions with fish migrating through the mid-Columbia between the Methow and Wenatchee basins and the lower river hatcheries. However, coho releases have occurred from these basins in the past, and are planned to continue under the *U.S. v. Oregon* agreements, with or without this project. Current plans under *U.S. v. Oregon* call

for the release of 1.7 million coho smolts and 400,000 sub-yearlings into the mid-Columbia basins (including the Yakima) in 1999 (The State of Washington, et al.). The plans of the coho reintroduction project to increase the survival of outmigrating coho smolts may result in increased impacts in the long run because more of them would survive to interact with other fish in the migration corridor than have in the past. However, survival is unlikely to increase enough during the two- to three-year timeframe of this EA to result in a significant increase in coho interactions with other fish in the migration corridor.

3.6.3 Genetic Fitness

Genetic fitness is a concern where a naturally produced anadromous fish population is being supplemented with hatchery-produced fish. In the case of the mid-Columbia coho project, there are no nearby surviving naturally produced anadromous fish populations. All of the mid-Columbia and Snake River coho stocks have been extirpated. The only concern would be if returning mid-Columbia coho adults from this program strayed into naturally produced lower river coho populations. The chances of straying would be lower under the action alternatives than under the existing situation (No Action Alternative) because the fish would be acclimated. As discussed in 3.3.1.1, acclimation tends to reduce straying. Also, straying coho adults would more likely return to the lower river hatcheries where they were raised than to natural habitats in the lower river.

3.6.4 Harvest

In the long term, the cumulative impacts of Phase 2 of the Mid-Columbia Coho Reintroduction Project (if implemented), in combination with supplementation and other similar projects both within and outside mid-Columbia basins, could be adverse for some unsupplemented wild stocks, if these projects are successful in increasing runs. Harvest pressure on unsupplemented wild stocks in mixed-stock fisheries might proportionally increase. On the other hand, such projects could also result in positive cumulative benefits for some weaker stocks due to a proportional dilution of weak stocks in the aggregate stock mixture. The Phase 1 activities covered by this EA, however, cannot increase the runs enough to create either increased harvest pressure or benefit.

3.6.5 Increasing Knowledge Surrounding Reintroduction of Extirpated Stocks

The Mid-Columbia Coho project aims to develop knowledge about how a largely domesticated stock might be reintroduced and naturalized in a basin where it has long been absent. This knowledge may be applicable throughout the Columbia basin. When combined with other current and future research on similar issues, the cumulative effect of the mid-Columbia project would be to increase the chances that other reintroduction projects would succeed, and that the concomitant resource risks would be reduced. These activities would serve to answer critical uncertainties associated with future reintroduction activities approved by the NPPC and funded by BPA.

Chapter 4 Consultation, Review and Permit Requirements

4.1 NEPA

The proposed project would be developed in a manner consistent with the National Environmental Policy Act and its implementing regulations, including Department of Energy implementing procedures (10 CFR 1021).

4.2 Threatened and Endangered Species and Critical Habitat

The Endangered Species Act of 1973, as amended (16 USC 1536), requires that Federal agencies ensure that their actions do not jeopardize threatened and endangered species and their critical habitats; it also gives review authority to USFWS and NMFS. Section 3.3.1.2 discusses impacts to threatened and endangered fish species in the Methow and Wenatchee basins, and section 3.4.1.3 discusses impacts to wildlife species. There is one federally listed plant species in the project area and one proposed for listing. Impacts are discussed in section 3.4.1.3.

BPA is in the process of consulting with both USFWS and NMFS on the impacts of the project to threatened and endangered species. A biological assessment, based on the discussions in this EA, is being prepared and will be submitted to them for review under Section 7 of the ESA. A permit for incidental take may also be required for the direct predation study and trapping (section 3.5.1). BPA and the Yakama Indian Nation will ensure that all necessary consultations and permits are obtained prior to undertaking the actions proposed in this EA, and that any permit conditions are followed.

4.3 Fish and Wildlife Conservation

Provisions of the Pacific Northwest Electric Power Planning and Conservation Act (16 USC 839 et seq.) are intended to protect, mitigate, and improve conditions for fish and wildlife of the Columbia River and its tributaries. This project is proposed as a part of the NPPC's Columbia River Basin Fish and Wildlife Program to fulfill these obligations.

The Fish and Wildlife Conservation Act of 1980 (16 USC 2901 et seq.) encourages Federal agencies to conserve and to promote conservation of non-game fish and wildlife species and their habitats. Measures proposed to mitigate potential impacts on vegetation and on fish and wildlife that are non-target species for this project do this to the maximum extent possible within BPA's statutory responsibility.

The Fish and Wildlife Coordination Act (16 USC 661 et seq.) requires that Federal agencies consult with the USFWS whenever an agency plans to conduct, license, or permit an activity involving the impoundment, diversion, deepening, control, or modification of a stream or body of water. BPA is coordinating with the USFWS as a project participant to ensure species protection as required by this act.

4.4 State, Areawide, and Local Plan and Program Consistency

4.4.1 State Permits for Work in Stream Beds

Hydraulic project approval from the WDFW would be obtained to construct any form of hydraulic project or perform other work that would use, divert, obstruct, or change the natural flow of any river or stream that contains fish (RCW 75.20.100, WAC 220-110). This approval would be necessary for the water intake and outfall construction proposed at the Two Rivers acclimation site.

4.4.2 Coastal Zone Management Program

The Coastal Zone Management Act of 1972 requires that Federal actions directly affecting the coastal zone be undertaken in a manner consistent, to the maximum extent possible, with the State's coastal zone management program. Washington's coastal zone management program is implemented through the provisions of the State Shorelines Management Act, including shoreline management programs developed/administered by the counties. The Coastal Zone Act Reauthorization Amendments of 1990 also require that proposed Federal facilities fully comply with Federal consistency requirements as determined by and through consultation with a designated coastal zone management agency.

BPA and the WDOE have a Memorandum of Agreement (MOA) that provides a process for State and local review of BPA projects in and directly affecting shoreline areas in the State. BPA would fully meet its obligations under the MOA, but no permit would be required.

All proposed acclimation sites and/or channels would be subject to requirements under Chelan County's Shoreline Master Program (1979), which takes its guidance from the State of Washington Shorelines Management Act. Although the sites are in areas designated variously as "Natural," "Conservancy," or "Rural," designations which allow different levels of development, because the sites are proposed to enhance fishery resources, they probably would be exempt from shoreline permits under Washington Administrative Code (WAC) 173-27-040 (Michael Kaputa, Chelan County, personal communication, 1999).

4.5 Wetlands and Floodplains Protection

Wetlands and floodplains could be affected. See section 3.4.1 and 4.7.

4.6 Heritage Conservation

Federal historic and cultural preservation acts include the National Historic Preservation Act (16 USC 470-470w-6), the Archaeological Resources Protection Act (16 USC 470aa-470ll), the Archeological and Historic Preservation Act (16 USC 469-469c), the American Antiquities Act (16 USC 431-433), and the American Indian Religious Freedom Act (42 USC 1996). See sections 3.3.1.1 and 3.4.1.

4.7 Permits for Discharges into Waters of the United States

Minor amounts of dredged or fill material may be discharged to the White River or associated wetlands during construction of the acclimation ponds. These activities would most likely be authorized by a U.S. Army Corps of Engineers nationwide permit (number 7 for intake and outlet structures) under the Clean Water Act (CWA) Section 404 (33 CFR 320-330). Certification that the discharge would not violate State water quality standards is required from the State of Washington. Other conditions may apply to the nationwide permits. Existing National Pollutant Discharge Elimination System permits for the hatcheries where operations could be expanded are expected to be adequate but will be modified before production is added if they are not (section 3.4.1.2).

4.8 Permits for Rights-of-Way on Public Lands

BPA would secure the necessary land use permits from the USFS for the Swamp Creek acclimation site and for plowing of the USFS road that provides access to the White River Channels acclimation site. Depending on final location, the White River site itself might also require a USFS permit. Use permits from Washington Department of Transportation may be required for the Swamp Creek and Butcher Creek sites if nets are put across the highway culverts.

4.9 Resource Conservation and Recovery Act (RCRA)

This act is intended, among other goals, to ensure environmentally safe disposal of non-recoverable waste residues, particularly those that are toxic or hazardous. These topics are discussed in section 3.4.1.2. BPA does not anticipate that any hazardous wastes, as defined by RCRA (42 USC 6901 et seq.), would be generated by the project. If they were, however, they would be manifested, packaged and shipped offsite for disposal under the appropriate regulations (40 CFR 260-268, 40 CFR 270-272, WAC 173-303).

4.10 Recreation Resources

Two proposed acclimation sites are near rivers that the Wenatchee National Forest has proposed for classification as Recreational Rivers under the Wild and Scenic Rivers Act. The values for which these rivers currently are being managed would not be affected by the project (see section 3.4.1). No National Trails, Wilderness Areas, National Parks, or other specially designated recreational areas would be adversely affected.

4.11 Requirements Not Applicable to This Project

Safe Drinking Water Act

This project would not affect Sole Source Aquifers, or require an underground injection well.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

No pesticides or herbicides would be used for this project.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

BPA does not propose to acquire property for this project, so surveys to determine site contamination requiring cleanup would not be done.

U.S. Army Corps of Engineers Permits for Structures or Work in Navigable Waters

This project does not affect waters classified as navigable waters according to the Corps definition in 33 CFR 329.

Farmland Protection Policy Act

The proposed project would not affect any prime, unique, or other important farmland as defined in the Farmland Protection Policy Act (7 U.S.C. 4201 et seq.).

The Executive Order on Environmental Justice

The project would not adversely affect minority or disadvantaged groups—no adverse effects on any human groups or individuals are expected.

Noise Control Act

WDOE regulates maximum environmental noise levels (WAC 173-60). Allowable levels depend on land use of the source and receiving property. Noise levels associated with the proposal and alternatives are discussed in section 3.4. Given the low level of noise expected to be generated and the lack of nearby sensitive receivers, State noise levels would not be exceeded.

Clean Air Act

No facilities would be constructed that would require air quality permits under the Clean Air Act (42 USC 7401 et seq.). Construction equipment exhausts would meet regulatory requirements.

Global Warming

The project would not cut trees or build facilities that would increase the potential for global warming.

Energy Conservation at Federal Facilities

This project does not propose construction of new buildings using energy, so BPA's policy to set an example for energy efficient construction does not apply.

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Glossary

Acclimation	A stage in rearing, preceding release, intended to condition fish to the ambient environment.
Alleles	One member of a pair or series of genes that can occur at a particular site or locus on a chromosome. Genetic characteristics.
Damboards	Temporary structures that control water levels using vertical stakes into which varying numbers of 2x4s or 2x6s are slotted.
Effective population	The size of an ideal population that would experience genetic drift and inbreeding at the same rate as the real population under consideration.
Founder effects	When the breeding population is reduced to a few individuals, the genetic material is limited, which may result in establishment of undesirable traits in a population.
Genetic diversity/ variability	All the genetic variation in an individual, population or species.
Genetic drift	Random changes in allelic frequencies due to natural sampling errors that occur in each generation; the rate of genetic drift increases as effective population size decreases.
Inbreeding	Mating of biologically related individuals.
Lacustrine	Living or growing in or along the edges of lakes.
Loss of within-population variability	The reduction in quantity, variety and identity combinations of alleles in a population.
Naturally produced fish	Fish that spawn in the natural habitat as opposed to being spawned through a hatchery program. They may be offspring of fish spawned in either natural or hatchery environments.
Redd	A salmon nest.
Smolt	Juvenile salmonid undergoing metamorphosis into a saltwater fish, usually during the downstream migration period.
Smolt-to-adult survival	Ability of a fish to survive from the time it leaves the sub-basin as a smolt until the time it returns to the subbbasin as an adult.
Smolt-to-smolt survival	Ability of a fish to survive from the time it becomes a smolt until the time it leaves the sub-basin.
Volitional release	A juvenile fish release strategy that allows an outmigrating fish to leave a rearing/acclimation pond without being pumped or forced.
Wild fish, wild population	Genetically unique populations of fish that have maintained reproduction successfully without supplementation from hatcheries.

APPENDIX A

SUMMARY OF COMMENTS ON DRAFT EA

Introduction

This appendix summarizes comments provided to BPA during the comment period for the draft EA (January 27 – February 17, 1999). Comments were e-mailed, written, or telephoned. In some cases, comments are quoted nearly verbatim; in others, they are condensed or combined with comments on similar subjects.

The following lists commenters on the draft EA. The way they are identified in the comment summary is shown in parentheses.

Kenneth A. Cobleigh, Issaquah, WA (Cobleigh)

Joe McInturff, Cle Elum, WA (McInturff)

Mary J. Roberts, Auburn, WA (Roberts)

Dick Rieman, Icicle Creek Watershed Council (Rieman)

Jeffrey S. May, Spokane, WA (J. May)

Steven S. May, Tall Timber Homeowner Assoc., Bellevue, WA (S. May)

Michael Hurley, Boise, ID (Hurley)

Rich Lincoln, Washington Dept. of Fish and Wildlife (WDFW)

Kurt Beardslee/Sam Wright, Washington Trout (Washington Trout)

Sonny J. O'Neal/Heather Murphy, U.S. Forest Service (USFS)

Rick Westerhof, National Marine Fisheries Service (NMFS)

Susan Crampton, Twisp, WA (Crampton)

Roger Woodruff, USDA Wildlife Services Program (Wildlife Services)

David Carie/Judy Delavergne, Mid-Columbia River Fishery Resource Office, Leavenworth, WA (USFWS)

Section 1.1 Need for Action

1. We conceptually support the coho restoration objectives of the tribes, but have not fully embraced the TRP and would rely heavily on Washington's Wild Salmonid Policy as we consider any salmon rebuilding proposal. (WDFW)

No response required.

2. The CRFMP does not present or require any specific formulation of coho planting locations or numbers, so the [project] partners are not compelled to implement any pre-defined coho planting strategy. (WDFW)

Response: Section 1.1 lists a number of regional policies and decisions that support the need for study of coho reintroduction, including the Columbia River Fish Management Plan under *U.S. v. Oregon*. BPA does not state or imply that the project partners are obligated to implement a particular coho planting strategy under the CRFMP, either in that section or in subsequent sections. See also response to comment #26.

3. Concerned that the project is not needed because Federal court rulings (*U.S. v. Oregon*) are already being met under the No Action alternative. (McInturff, J. May)

Response: While lower river hatcheries do currently provide coho smolts for placement into the mid-Columbia tributaries, these programs are not achieving sufficient returns of adult coho to mid-Columbia tributaries, where several Indian nations have treaty fishing rights for historical fish populations. The research proposed in this EA is designed to study whether additional efforts, including acclimation and development of a local broodstock, can increase the rates of returning adult coho and go further toward meeting the intent of the *U.S. v. Oregon* requirements.

4. Concerned that money is being spent on coho, which have been gone from mid-Columbia basins for 80 years, when species that still survive—such as bull, cutthroat and rainbow trout, and spring chinook and sockeye salmon—are weak and should be the priority for saving and strengthening. (J. May, S. May, Hurley)

Response: As stated in section 1.1 of the draft EA, coho reintroduction is one of fifteen high-priority actions that were identified in 1996 by the fishery co-managers (Oregon and Washington Departments of Fish and Wildlife and the Tribes). These projects received the endorsement of the National Marine Fisheries Service. They were recommended for funding by BPA through the Northwest Power Planning Council's Fish and Wildlife Program. Therefore, there is regional consensus that this is a high-priority project.

BPA, the Tribes, and other entities in the mid-Columbia are, at the same time, working to save and strengthen other species, such as spring chinook and steelhead,

and their habitat. The NPPC's FY 1999 Annual Implementation Work Plan lists mainstem passage improvements, tributary screening, the spring chinook hatchery program at Leavenworth NFH, supplementation activities being funded by Chelan PUD through the Rock Island Dam Settlement Agreement, and a project to improve the Methow Valley Irrigation District's system to enhance flows for fish. Additional habitat protection and supplementation activities are being developed and pursued through the Mid-Columbia Habitat Conservation Plan currently under development by the Mid-Columbia PUDs and NMFS.

5. Concerned about timing of this project. Specifically, can an introduced, out-of-area stock prosper given that native, wild stocks are in danger? These sensitive stocks may be indicators of a system that is out of whack. "It may be a waste of … money, and quite possibly biologically detrimental, to initiate these projects until the habitat/environmental problems are fixed and sensitive/depleted populations are well on their way to recovery." (Hurley)

Response: This project is being proposed with a two-phased approach to help answer these questions. The two major questions this first phase of the project seeks to provide information about are:

- whether adult returns can be increased sufficiently to make this a viable program, and
- whether there would be unacceptable impacts to sensitive species.

The project would move into Phase 2 only after there is sufficient information to at least begin to answer these questions. Please see also responses to comment #4.

6. Why is BPA becoming involved at this point? It appears to be for funding purposes only. . . . Taxpayer dollars should not support this untimely Tribal proposal. (Crampton)

Response: BPA is required by the Northwest Electric Power Planning and Conservation Act of 1980 to protect, mitigate, and enhance fish and wildlife that have been affected by the construction and operation of the Federal Columbia River Power System. This project is proposed as part of the plan to mitigate for those losses and was agreed to by regional entities (see response to comment #4 above). BPA's role in this effort is that of a funding agency, but its funds are provided by ratepayers (those who pay for power and transmission services), not by taxpayers. Also see response to comment #5 above.

7. One can only assume that the long-term objective is establishment of self-sustaining coho populations in the mid-Columbia. Many of the project elements would not be appropriate or necessary if the only desired end-point was a viable hatchery broodstock. Given this conclusion, the EA must address the environmental impacts of self-sustaining coho populations, not just the initial steps that are taken to reach this primary objective. (Washington Trout)

Response: The first section of the EA directly states that the long-term objective of regional fish managers is establishment of self-sustaining coho populations.. However, BPA and the NPPC are unwilling to commit substantial resources to such an effort without some indication of its potential for success, as reintroduction of an extirpated fish species is not a well-researched action. BPA believes that if research shows that the potential exists for full-scale reintroduction to be successful, and that impacts to other sensitive species can be minimized to acceptable levels, then, under NEPA, the time would be "ripe" to assess the effects of such a program (section 1.4.1), most likely in an EIS. At this point, however, because of the lack of data on such an effort, feasibility research is required.

8. This is a significant proposal, to fund introduction of one more unknown and potentially destabilizing variable into the currently unstable conditions of the mid-Columbia. An EIS should be completed. (Crampton)

Response: Please see response to comment #7.

Section 1.4.1 Decisions Based on This Environmental Assessment

9. Add USFWS as an entity that will provide a Biological Opinion on effects to fish and wildlife species under the ESA.

Response: BPA apologizes for this oversight.

Section 1.4.2 Future Decisions

10. Historic loss of floodplain rearing habitat (e.g., side channels) should be considered as a potential limiting factor in the success and initiation of this project. (Hurley)

Response: The overriding question which first must be answered is the one that addresses whether or not smolt-to-adult survival is adequate to provide adult returns. Much of the work during the period covered by this EA addresses that question. If the initial question were answered positively, a logical next step would be to assess potential limiting factors such as rearing habitat.

11. If negative ecological interactions are detected or considered probable by observations, will the project be modified or terminated? What are the criteria for these decisions, and how and when will they be implemented? You should state now the levels of predation that would be acceptable for continuation of the project. (Hurley, Washington Trout)

Response: The project participants and technical team will review the results of the studies on an annual basis and decide, based on these results, whether the project should be modified or terminated. As stated in Section 2.2, BPA, YIN, WDFW, NMFS, and USFWS, must be in agreement before actions are taken.

At this time, it is not possible to set absolute criteria for acceptable or unacceptable levels of negative interactions with other species. This project is studying a question that has not been well-studied: how to re-introduce an extirpated fish species into the natural environment. Many variables contribute to the ecology of all species. The status of non-target species, such as spring chinook, could be affected by a number of factors both natural and human-influenced, including the reintroduction of coho. The technical team will annually evaluate the study results and current status of the sensitive species, and take actions to ensure that risks to them are maintained at acceptable levels.

12. I disagree that this is a feasibility project. Releasing up to 1.4 million coho for several years means it is truly a reintroduction project. If any measurable adult returns are achieved on a consistent basis, I cannot conceive of any environmental impacts which could justify cancellation of the effort. (Washington Trout)

Response: BPA disagrees. It is highly unlikely, in the timeframe identified for this project (2-3 years), that naturally-spawning coho would become established in any significant numbers. First, the expected adult coho returns, based on the Yakima River coho project returns, would number only in the hundreds. Secondly, most of these fish would be captured at the dams and taken into the hatchery for the development of a local broodstock. So it is unlikely that sufficient numbers of coho would escape capture to spawn naturally and thus reintroduce the species during the period of this research. Please see also response to comment #11.

13. If the NPPC's 3-step review is initiated in 2000, data and information germane to feasibility questions will not be available, most importantly, adult survival data. (WDFW, USFWS)

Response: Section 1.4.2 states that the review could begin in September 2000; it does not imply that the date is firm or that a decision would be made then. There will be some results by then, and the review process itself will take at least a year. It is expected that the review would begin with an update to the Council of current information, to determine how and when to proceed with the review process.

Section 1.5 Scoping Issues

14. There is no mention of predator control work now taking place in the Columbia and how it might affect the project and other BPA work. Measures include overhead wires at the dams, hazing and shooting to protect migrating smolts from gulls; addling gull eggs at a colony below Priest Rapids Dam; and squawfish removal at Rocky Reach and Rock Island dams. (Wildlife Services)

Response: Thank you for the information.

15. The EA did not include a list of issues that the NEPA team developed. This could be placed in the Scoping Issues section. (USFWS)

Response: Section 1.5 (Scoping Issues), plus the issues addressed in the EA, represent the issues developed by the NEPA team and the public.

Chapter 2 Proposed Action and Alternatives

16. Support rapid implementation of the proposed action because:

- it is the only alternative that allows for statistically sound monitoring;
- it accounts for the unique characteristics of each basin;
- it is the only action that addresses even the bare minimum of unknowns in the coho life cycle;
- it is relatively inexpensive;
- the no action alternative has been tested for years with poor results and the other alternatives are only shots in the dark. (Cobleigh)

No response required

17. Support the experimental nature of the Tribal Alternative and wish to be involved in all aspects of implementation of the project. (USFS)

Response: As stated in section 1.3, the USFS is a project participant.

18. Support the Phased Study Alternative because all the goals of the proposed action and Federal requirements could be met while minimizing costs to taxpayers. (McInturff)

Response: Thank you for your comment. Just for clarification, BPA and its operations, including fish and wildlife project funding, are paid for by ratepayers (those who pay for BPA's power and transmission services), not by the taxpayers. BPA is unusual in that it does not typically receive annual appropriations, although it does have a sort of revolving credit or borrowing authority that Congress has approved which allows BPA to borrow from the U.S. Treasury for large capital projects and then repay the loans with interest. In addition, Congressional committees review BPA's proposed annual budgets, so it is important for BPA to spend the ratepayers' money wisely.

19. Fear that the ultimate goal of this project would be to request or require that dams be breached for salmon, but dams are needed more than salmon for power, irrigation and transportation. (McInturff)

Response: Project proponents recognize the existence of the dams and have no plans to propose breaching them to facilitate reintroduction of coho. The study is designed

to see how well coho survive and return to the mid-Columbia given current constraints.

20. There should be detailed monitoring of life history changes from both hatchery and natural long-term adaptation. (Hurley)

Response: The Tribal Alternative proposes detailed life history monitoring. These studies are described in the genetic monitoring section of the Study Plan (YIN 1998).

21. The EA should discuss the merits of coho egg and/or fry plants in the same systems instead of smolts. Although competition problems would be greater initially, costs of developing acclimation ponds would be eliminated. In addition, the fry population would have much more genetic variability than the proposed hatchery smolts and would undergo a full year of natural selection during natural stream rearing. (Washington Trout)

Response: We agree that in a restoration program, maximizing genetic variability is important, especially when the donor stock is from a very domesticated hatchery stock. In fact, a critical component of the restoration effort is to establish a localized broodstock with as much genetic variability as possible. In the future, outplanting eggs, fry or fingerlings may make biological sense from a selection and restoration standpoint. However, given the critical status of other salmonids in the region (steelhead are listed and spring chinook are about to be listed under ESA), planting large numbers of hatchery coho eggs or juveniles raises concerns about competition, especially when the coho would considerably out-number the other species of concern. NMFS and WDFW have requested strict risk containment measures during this information gathering phase of the program; planting large numbers of eggs or fry would unacceptably increase risks. Once data are collected and an evaluation made of critical uncertainties related to freshwater rearing interactions, then egg and/or fry plants may become prudent and advantageous. Study of predation impacts of coho smolt plants is a key component of the monitoring and evaluation program, as is study of second generation interactions with naturally rearing juvenile coho and other species of concern.

Smolts have been shown to survive to adulthood at higher rates than fry or egg plants. Development of the localized broodstock is a critical portion of all action alternatives. Fewer smolts than fry or eggs would need to be released to develop a functional localized broodstock.

22. The full range of alternatives needs to be addressed under NEPA, including one that includes the activities of the No Action alternative in combination with some monitoring activities associated with fin clipping, redd surveys, snorkeling, and possibly predation studies. (USFWS)

Response: All the actions described have been evaluated in the EA. NEPA does not require an agency to evaluate every possible combination of activities—just a full range, which has been done.

23. We want Chelan P.U.D. to resume the planting of rainbow trout. (S. May)

Response: This is not BPA's decision.

24. The EA did not discuss any alternatives that were considered and dropped during the NEPA process. (USFWS)

Response: That is because there were none. The range of alternatives in the EA includes all the alternatives suggested during scoping.

Section 2.1 No Action Alternative

25. The paragraph states that 1 million coho are being released in the mid-Columbia under *U.S. v. Oregon*. This proposal identifies up to 1.4 million for release into the Wenatchee and Methow Rivers, presumably in addition to those proposed for release into the Yakima River. (WDFW)

Response: Under the *U.S. v. Oregon* management agreement for 1997 brood, up to 1 million coho from the Lewis River Hatchery Complex and 700,000 from Cascade Hatchery (both yearling pre-smolts) are to be reprogrammed upstream for release in the Yakima and mid-Columbia tributaries. In addition, up to 400,000 sub-yearlings may be available to be reprogrammed for the same destinations. The 1 million coho smolts referred to in the draft EA under section 2.1 are the ones in the management agreement that, as of the date of EA publication, had not been targeted to specific sites in the Yakima or mid-Columbia basins, whereas the remainder had been targeted to sites in the Yakima. Therefore, it was assumed that the 1 million could be placed in the Methow and Wenatchee basins, if BPA did not fund the research described in other alternatives. However, parties could also decide to divide them up among all three basins, to put them all in the Yakima basin, or to distribute them in some other combination. Information on total coho releases in the three basins has been added to section 2.1.

The smolts to be used for research under the Tribal Alternative would come from the 1.7 million (we are not counting the 400,000 sub-yearlings) assigned to the mid-Columbia/Yakima under *U.S. v. Oregon*. No alternative evaluated in the EA proposes to release more fish into the Methow, Wenatchee, and Yakima basins than are already programmed for those three basins under *U.S. v. Oregon*. The exception would be if local brood is developed from returning adults and there are releases from their offspring. Then we could have up to 1.4 million coho smolts in the mid-Columbia (lower river plus natural origin fish).

26. Whether or not these releases [under *U.S. v. Oregon*] could occur annually without monitoring and evaluation presumably would be affected by NMFS. (WDFW)

Response: BPA agrees and so stated in section 2.1. However, BPA is not a party to *U.S. v. Oregon*, and its conditions are not subject to influence by BPA. For the purposes of the EA analysis, we assumed that if BPA did not fund new coho research under this proposal, the actions agreed to in the current (1997 brood) *U.S. v. Oregon* management agreement on coho would take place.

27. No Action may provide some useful information since fin clipping is already occurring on the released fish. (USFWS)

Response: Fish planted in 1999 will not be fin-clipped for research. The marking is already done, so the opportunity is now gone, although it could happen for 2000. In addition, some researchers question the extent of information provided by fin clips.

Section 2.2 Tribal Alternative (Proposed Action)

28. PIT tagging only 7-8,000 fish per drainage will not generate sufficient adult returns to allow any calculation of smolt-to-adult survival. (USFWS)

Response: PIT tagging is proposed to monitor smolt-to-smolt survival, not smolt-to-adult survival. The project proposes to use dam counts to estimate smolt-to-adult survival. The relevant paragraphs in section 2.2 and 3.5.1 have been made clearer.

29. Several other forms of interactions besides direct predation should be fully developed in this proposal. (WDFW)

Response: Other types of interactions are being studied in the Yakima basin. As stated in section 1.4, the results from those studies will contribute to decisions on coho interactions in the Methow and Wenatchee basins. Details of those studies are described in the Study Plan (YIN 1998), and more explanation of the role of the Yakima basin research was added to section 2.2.

30. Three trapping sites and two studies are mentioned in relation to the predation studies. Is this an error? (WDFW)

Response: The statement has been changed to refer to two potential juvenile trapping locations, with two predation studies. However, a total of three traps might be used.

Section 2.5 Comparison of Alternatives

31. It is unclear whether the Tribal Alternative will produce the information as suggested. Specific implementation plans have not been developed and it is unclear whether protocols are in place or under development to achieve the stated evaluations. (WDFW)

Response: Specific implementation plans for 1999 were proposed and are currently undergoing review by NMFS and WDFW. Protocols for the evaluations are presented in the Study Plan, which is referenced in several places in the EA, including in section 2.2. The process for developing specific implementation plans and protocols is discussed in section 2.2, page 9 of the draft EA, and elaborated upon in the response to comment #11. BPA continues to believe, from the information provided by the various project participants, that the Proposed Action has the greatest potential to answer the questions needed to determine if coho reintroduction is feasible.

32. The commenter appears to disagree with the assessment about how the Tribal Alternative meets the purpose of protecting ESA-listed species (although this disagreement is not stated directly), because the alternative proposes to study only direct predation, and because it does not propose to reduce ecological risk potential by managing fish planting dates, thereby not addressing other sources of increased risk. (WDFW)

Response: The alternative does not propose expensive studies of all potential interactions because, as indicated in the Study Plan, the Technical Work Group agreed that certain studies done in the Yakima basin could be applicable to other basins in the region. This point is made in section 1.4 of the draft EA, but has been expanded and repeated under the description of the Tribal Alternative in section 2.2. In addition, conclusions of researchers indicate that the risk to other species from indirect predation, disease transfer and competition (the only other potential interactions expected from these short-term studies) is low. The low risk is further reduced by risk containment measures as outlined on p. 34 of the draft EA, with respect to competition, and on p. 36 with respect to disease transfer. Discussion of these measures has been added to the predation section of the final EA.

33. The Hatchery Releases alternative would not be expected to increase complexity and would certainly be the least complex logistically of all alternatives. If the issue is limited to complexity for BPA, that should be noted under "Purposes." (WDFW)

Response: Section 1.2 ("Purposes") does state that the purpose is to achieve cost and administrative efficiency in BPA fish mitigation efforts. The re-statements of the purposes in section 2.5 have been changed to add that detail. BPA disagrees with the commenter's conclusion about the Hatchery Alternative, however. The alternative would increase the administrative complexity for a number of participants besides BPA, including at a minimum NMFS, USFWS, NPPC, and the Yakama Nation, as

well as WDFW, if we assume that the regional goal to re-introduce coho to the mid-Columbia remains in place. This is because additional decision-making steps would be required to define further research needs to examine ecological impacts if the Hatchery Alternative showed coho survival could be achieved.

34. The No Action alternative has the potential to produce significant knowledge if monitoring is conducted as envisioned in re-negotiation of the CRFMP (WDFW).

Response: BPA is not a party to the *U.S. v. Oregon* process and has not been made aware by any project participant or any party to the re-negotiation of the CRFMP what monitoring might be conducted under the *U.S. v. Oregon* stipulations. As the commenter implies, the plans are not set. What one party envisions may not survive negotiations with others. As stated in response to comment #26, for the purposes of this analysis, BPA assumes that the situation with mid-Columbia coho, without BPA funding of new research, would be what is currently stated in the 1997 broodstock coho agreement.

35. The Hatchery Releases Alternative has the lowest ecological risk, primarily because coho would be released directly from the hatchery rather than into spring chinook spawning and rearing habitat. (WDFW)

Response: BPA stated this conclusion in Table 3 and in the subsequent discussion, with the caveat that direct predation monitoring would not be conducted under that alternative (as proposed by WDFW), so there is little risk protection.

36. Predation should be monitored where possible, even if we can't get a statistically significant sample. (NMFS)

Response: The Hatchery Releases alternative was proposed by WDFW. In discussions about what this alternative should encompass, WDFW declined to propose predation monitoring, as they felt the study should focus on only one question: whether adults would return to mid-Columbia basins.

Chapter 3 Affected Environment and Environmental Effects

37. Suggest several formatting changes, including moving some information on project details from chapter 3 to chapter 2; putting summary tables after discussions; providing a separate chapter for Affected Environment that covers in more detail such issues as watersheds, grazing, grizzly bear recovery plans, and fishing; and adding detail to Table 4. (USFWS)

Response: Whether formatting of complex documents is considered effective can be a matter of what a reader is used to. BPA has specific reasons for choosing the EA's format. Because the environmental effects of the project vary depending on whether we are talking about fish releases or land use effects of site development, the relevant

project details and description of the affected environment are placed close to the discussion of related impacts for easier reference.

Summary tables are introduced first so that readers may choose to skip the text if they are merely skimming for conclusions, but they are advised in advance that the details come later. Table 4 is designed to be a summary of impacts only. The details, as explained in the introduction to the table, are in the subsequent text.

The suggested additions to the Affected Environment material would not be relevant to the decision, because the proposal or alternatives would not affect those resources. As the Council on Environmental Quality Regulations for Implementing NEPA state (in reference to Affected Environment for EISs), "The [EIS] shall succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration. . . Data and analyses in a statement shall be commensurate with the importance of the impact. . . Agencies shall avoid useless bulk in statements . . . Verbose descriptions of the affected environment are themselves no measure of the adequacy of an [EIS]." (40 CFR, 1502.15) Such guidance applies even more to EAs, which are supposed to be brief documents.

Section 3.2.1 History of Mid-Columbia Coho and Their Habitat

38. Although it is true that Mitchell Act hatchery production ultimately resulted in high harvest rates in the lower Columbia River, it is not likely that upper Columbia River stocks were "wiped out" by these fisheries. Those stocks were gone in the 1930s, long before construction of Mitchell Act hatcheries, as evidenced by Rock Island Dam fish ladder counts. (WDFW)

Response: Reference to Mitchell Act hatcheries has been deleted from this section.

39. Address effects on fish populations by Native American fishing practices and techniques (USFWS)

Response: Historically, there was a Native American coho fishery in the Wenatchee. After construction of dams in the basin in the early 1900s, tribal members moved to fish below these dams (Mullan 1983). Although Mullan quotes reports of fish congregating below the dams, the effect of that move on fish populations is unclear.

40. Returning adults at Priest Rapids cannot be considered Turtle Rock strays because they may yet ascend the dam and return to their upstream release site. (USFWS)

Response: Wording has been changed in paragraph 5 to "Since 1988, adult counts at Priest Rapids Dam have averaged only 16 coho, probably a result of releases from Turtle Rock Hatchery, which annually released 600,000 coho smolts until the program was terminated in 1994."

41. This section states that coho programs such as that conducted at Turtle Rock were poorly administered. The coho program at Turtle Rock was discontinued both because it was unsuccessful and was of lower priority, given that the facilities were provided to help mitigate for chinook losses. (WDFW)

Response: The EA does not say that Turtle Rock was poorly administered—it says: "Existing coho programs were poorly administered, unsuccessful, **or** lower priority," and that Turtle Rock, as an example, was discontinued because of disease problems that resulted in poor returns, and because coho were lower priority.

42. Disagree that most habitat problems have been corrected in these basins. (USFWS, NMFS)

Response: Editorial changes have been made in section 3.2.1 to reflect these concerns.

Section 3.2.2 Coho Life Cycle and Habitat

43. Discuss when coho typically spawn, what size substrate they would use, how far up watersheds or tributaries they actually spawn, and what they typically eat. (USFWS)

Response: A discussion has been added to section 3.2.2.

Section 3.2.3 Other Fish Management Activities

44. Add a section on resident fish management. (USFWS)

Response: Discussion has been added to this section.

Section 3.3 Effects of Incubating, Rearing, and Releasing Coho, and Selecting Coho Broodstock

45. Concerned that the risk assessment include additional information on such items as non-target species; the overlap between various coho life stages and those of possible affected species; potential sources of ecological risk and some assessment of the probability that a specific interaction might occur; risk containment measures that might reduce the probability that a specific interaction will occur; and operational security of specific acclimation sites. (WDFW)

Response: Information has been added in several places in chapter 3 on non-target species, overlap of life stages and operational security (flood potential). The draft EA already included assessment of risks and risk containment measures, although in several cases this information has been supplemented or made clearer. BPA will continue to work with the Technical Work Group to further refine the risk assessment before decisions are made for 2000 and beyond.

46. Concerned about effects on spring chinook salmon, steelhead, bull trout, and sockeye. (USFS)

Response: Effects on these species were addressed in the draft EA.

Section 3.3.1 Proposed Action and Phased Study

47. The survival rates anticipated seem to acknowledge that insufficient adults will return to sustain even a hatchery-based program. This is counterbalanced by very large numbers of fish released, increasing the potential for negative ecological interactions with limited benefits in terms of adults produced (WDFW).

Response: The text in the second paragraph of section 3.3.1 makes it clear that these are initial survival rates and that the project is attempting to improve them through the use of acclimation and improved fish health and hatchery practices. The proposed action suggests that, in an attempt to improve on existing practices that appear not to be successful, the way to test if out-of-basin fish can be adapted to the natural environment is to release large enough numbers to achieve sufficient returns for development of a locally adapted broodstock, rather than to rely on fish bred in and for lower Columbia conditions.

The potential for negative ecological interactions is also a consideration. BPA is seeking to reach a consensus among the parties that balances the production and ecological interaction considerations.

48. Add a discussion about how long the coho are acclimated and what happens during acclimation. (USFWS)

Response: A discussion has been added to section 3.3.1.

3.3.1.1 Genetic Effects [Proposed Action and Phased Study]

49. The actual smolt-to-adult survival rates should be presented for comparison. (WDFW)

Response: Actually, the effects of acclimation tend to improve smolt-to-adult survival rates approximately four-fold. The mean smolt-to-adult rate for acclimated smolts (mean = 0.163%) was significantly ($p = 0.018$) higher than non-acclimated smolts (mean = 0.042%). This information has been added to section 3.3.1.1.

Section 3.3.1.2 Ecological Interactions [Proposed Action and Phased Study]

50. Many of the non-native species listed in Table 5 are more likely to prey on sensitive species than coho are. (NMFS)

Response: We agree.

51. It is not accurate to say that all adult spring chinook are being collected for captive broodstock program in the Methow (p. 31, draft EA). The implied conclusion that direct coho predation is not a risk to spring or fall chinook probably is premature given the scope of current studies in this area (WDFW).

Response: The language has been corrected to indicate that all adult spring chinook are being collected for an adult-based supplementation program. There is no implied conclusion in the discussion of coho predation on spring chinook. The draft EA states on p. 31 that opportunities for coho predation on spring chinook would be minimal in the Methow because of the spring chinook broodstock collection program and collection of coho adults; and based on data collected to date by the YIN, that overall risk of predation has not been shown to be significant, although there is uncertainty. The EA does not state or imply that there is not a risk.

52. Concerned about releasing coho for the predation study into Nason Creek at the Butcher Creek site because of the risk of interactions with one of a few endangered spring chinook populations in the Wenatchee system. (WDFW)

Response: The proposal has changed—coho would not be released from Butcher Creek in 1999. The option remains for 2000 and 2001; however, all parties, including the private landowner, would need to agree for this to occur.

For 1999, the proposal is to release 75,000 coho from the Swamp Creek site and to collect as many coho as possible at the existing Wenatchee sockeye trap. Any coho collected would be analyzed for their stomach contents. However, the release location is too far downstream from the majority of spring chinook habitat for coho to be exposed to enough spring chinook to make the study results statistically significant. In addition, because the existing trap location is designed for sockeye studies, it is not placed in the stream in a way that is expected to collect sufficient coho samples.

BPA is working with project participants to find an acceptable site for future-year predation studies within the range of options evaluated in the EA. If agreement cannot be reached, predation studies will not be implemented as part of this project.

53. Cutthroat and bull trout are native to the White River, bull trout survival would be at risk with coho in the same environment, and cutthroat would be displaced by coho and subject to bird predation. (J. May) Concerned about coho predation on bull trout in the

upper White River mainstem below Panther Creek (USFS, spawning surveys 1997) and in the mainstem Chiwawa River between Atkinson Flats Campground near river mile 19 and Phelps Creek. (USFWS)

Response: While the draft EA (pp. 33-34) presented findings from the literature on bull and cutthroat trout as stated by the first commenter (except for the bird predation), it also discusses research and rationale that supports the conclusion that risks to bull and cutthroat trout in this area would be limited. The acclimation site on the White River is about 1.5 miles downstream of the furthest downstream extent of known bull trout spawning according to the 1998 Washington Salmonid Stock Inventory, Bull trout/Dolly Varden Appendix. Since coho would most likely leave the acclimation site and move downstream immediately, and since bull trout tend to stay on the spawning grounds until they are large enough not to be a prey sized item for coho smolts, the chances for interaction under this alternative are low. If this site were used, coho smolt predation on bull trout would be monitored at the screw trap downstream of the Lake Wenatchee outlet. Predation of bull trout juveniles by coho smolts could become a problem in the long run if coho return to spawn upstream of the acclimation site in significant numbers, but that is unlikely under the timeframe of this EA. Conversely, coho might also benefit bull trout in the long run as coho juveniles probably would become prey for adult bull trout.

54. Concerned about coho predation on species such as Westslope cutthroat trout (a USFWS Candidate species), redband trout, and lake trout. (USFWS)

Response: These species have been added to Tables 5 and 6, but effects on them, as for other trout species, are expected to be limited for the reasons cited in chapter 3. According to Richard Smith, USFWS, although Westslope cutthroat trout is undergoing a 12-month review on whether it should be listed, it is not a Candidate species at this time. (R. Smith, USFWS, 3/5/99).

55. Predation is exacerbated by large numbers of hatchery fish, particularly when they are noticeably larger than wild smolts of the same species. The “sizing” process needs a more detailed explanation in the EA. You will be working against the positive correlation between fish size or condition and ultimate smolt-to-adult survival rates. (Washington Trout)

Response: Size details were provided in the draft EA. However, a more explicit explanation has been added to the predation discussion in section 3.3.1.2—they will be sized to be smaller than regular hatchery fish, to more closely match wild coho. Many factors contribute to the survival of both wild and hatchery salmon smolts. Perhaps one of the most important factors is the physical health and condition of the smolts. We acknowledge that smolt-to-adult survival may be lower for smaller coho smolts than for larger ones; however, the project is willing to accept potentially lower smolt-to-adult coho survival for the sake of risk containment.

56. I consider that displacement of wild fish from massive hatchery releases is an under-assumed detriment to wild populations, and I have serious doubts whether this will be a minimal impact. . . What do you propose to do to minimize this? (Hurley)

Response: Risk containment measures are described for the Proposed Action and Phased Study alternatives on p. 34 of the draft EA; the final EA adds information on risk containment of potential predation effects in section 3.3.1.2. As stated on p. 37 of the draft, risks might be less under the Hatchery Releases alternative for a variety of reasons, but without monitoring, could not be confirmed.

57. Concerned about overlap in spawning and rearing habitat and spawning migration timing between coho and bull trout. (USFWS)

Response: As stated in section 3.3.1.2 and in response to comment #53 above, coho smolts under this proposal would be reared in acclimation ponds with barriers to entrance by other fish and to exit by coho. Once the barriers are removed, coho begin their migration immediately, so they are not expected to overlap with bull trout rearing areas. Spawning migrations of coho and bull trout do overlap, but because of the low numbers of returning coho expected during the period of the proposed research, little impact to bull trout is expected.

58. Indicate that sockeye spawn below the Two Rivers and White River acclimation sites.

Response: Spawning locations of sensitive species in the basin have been added to a new section 3.2.3 entitled "Other Fish Species in the Wenatchee and Methow Basins."

59. Concerned about overlap of spawning habitat use between coho and spring chinook and sockeye. (USFWS)

Response: Similar to the situation with bull trout, because of the low numbers of returning coho expected during the research period, little competition for spawning habitat is expected. The risk of predation by coho on emerging sockeye is discussed in section 3.3.1.2.

60. The highest priority concern that needs to be addressed is the following from Hearn (1987): "Microhabitat may also differ from published accounts because allopatric populations undergo 'ecological release,' a process in which a species niche expands in the absence of interspecific competition. . . In such cases, species introductions or restorations may cause intense interspecific competition and declines in population densities of the ecologically released species, even though the two species co-exist elsewhere." (Washington Trout)

Response: In order for competition to have a negative impact on either of the two species populations competing for a common resource, that resource must be critical

to their survival and in short supply. The commenter appears to assume that 1) ecological release has occurred with any or all species within this region; 2) a shift in microhabitat utilization will occur after the reintroduction of coho; and 3) and that this shift will result in a reduction of the growth, survival or gross distribution of the species of concern. There is no definitive evidence that this would occur in the long term, but in any event, the effect would not occur during the brief period of the research evaluated in this EA.

61. The parts of the EA that deal with critical salmonid species interactions need a lot of work. It appears that the writers started with a pre-conceived bias for minimizing these problems and/or relied too heavily on abstracts or secondary referencing. . . Some critical reports such as Allee (1982) need to be carefully studied since the abstract and narrative do not match up very well with quantitative data presented in the same report. In any case, there is more than enough evidence to show significant interactions between coho salmon and steelhead or resident trout (. . . especially Glova 1984 and 1986, Johnston 1981, Adeniyi 1990, Fausch and White 1986, Tripp and McCart 1983, Allee 1982, Hartman 1965, Sheppard and Johnson 1985, and Gibbons et al. 1985). The case for interactions with summer/fall chinook is less compelling but indications do exist (Ames 1981) and the mechanisms can differ by area (Lister and Genoe 1970 and Stein et al. 1972). The case for spring chinook falls somewhere in-between. McIntyre (1983) examined historical data for five populations of spring chinook in the Columbia Basin. He suggested that one reason for differences observed between chinook salmon in the Warm Springs River and other streams was the possibility that the presence of coho salmon reduced its productivity for chinook. (Washington Trout)

Response: We respectfully disagree. Many of the references cited by the commenter are also used as sources for our conclusions. However, researchers reviewed again the sources cited by the commenter, and have concluded that the commenter reaches conclusions—that any displacement or shifts in microhabitat are extremely detrimental to that species—that are not justified by the information cited. Several of the citations referenced by the commenter (Allee 1982; Hartman 1965; Glova 1986) acknowledge that competition may be specific to each situation, yet the commenter does not acknowledge or is not aware of the Spaulding et al. (1989) study which assesses the impacts of coho competition on chinook and steelhead juveniles specifically in the Wenatchee River system. We strongly disagree with the statement that the abstract Allee (1982) presents contradicts the narrative in the same report. Furthermore, Fraser (1969) suggests that both intraspecific and interspecific competition is strongly correlated to density of each species, and is also largely dependent upon the size disparity between individuals (Fraser 1969; Allee 1982; and Hartman 1965). BPA proposes specific risk containment measures that are intended to minimize the risk of competition. Specifically, as stated in section 3.3.1.2, we intend to keep stocking densities low and the size of hatchery fish relatively small compared to typical hatchery coho.

62. Researchers seemed to assume, when evaluating impacts of competition and predation, that the study area is fully seeded with fish. However, because there was a long delay in implementing effective wild trout management regulations, there probably was a lot of overfishing of resident and anadromous stocks. All the recent studies cited in the EA really proved is that the research areas were underseeded. (Washington Trout)

Response: BPA said in the draft EA on p. 35 that the risk of adverse competition effects could increase if Phase 2 is implemented and stocking or natural production increases coho numbers in the long term, but that the effect is not expected in the time frame of this EA. The commenter's point—that trout are not fully using existing habitat in this area—supports our conclusion that, for the period of this research, adverse competition effects are unlikely. Whether or not trout or other fish populations would be fully seeded at some point several years in the future is an issue for the evaluation of impacts of Phase 2 implementation.

As pointed out in the predation discussion, predation of coho on other species is influenced by size of coho and prey and by speed of coho out-migration, as well as by prey abundance. So, although one factor limiting coho predation may be that other species numbers are low, because the period covered by this EA is only a few years, then the commenter's point would seem to support our conclusion.

63. Some of the proposed acclimation facilities might result in higher than normal rearing densities and biological loading (WDFW).

Response: The project proponents plan to meet or improve on state criteria for rearing densities and biological loading.

64. If a fishing season is established for coho, Phase 2 will need to address effects of fishermen and their equipment and destruction of riparian vegetation. (USFWS)

Response: We agree that effects of harvest are subjects for Phase 2.

65. Adding coho to the fishery would result in a very complex mixed stock fishery situation. The EA needs to address harvest in a much more comprehensive manner, especially the fact that the decision will really impact all salmonid stocks originating above Bonneville Dam as opposed to only those originating in the Wenatchee and Methow systems. (Washington Trout)

Response: For the time period of this EA, and well beyond, the number of returning adults is not expected to be large enough to justify a fishery. Harvest impacts would be assessed in the NEPA document that assesses the impacts of any proposal to implement a full coho reintroduction effort.

66. Address effects to bears and the watershed from an increase prey base that will now include coho. (USFWS)

Response: For the period of this EA, the numbers of returning coho would be too small to increase the prey base or affect bears.

67. Address effects to coho from predation by bull trout and northern pikeminnow (squawfish). (USFWS)

Response: The level of effect on coho by predators in this area is unknown. Part of the purpose of this research is to see if coho survive the obstacles to reintroduction, such as predators. Although the point is made late in the draft EA, a statement has been added to the introduction to chapter 3 that, because coho are considered research fish, the effects on them are not part of the analysis of this EA.

Section 3.3.3.2 No Action Alternative [Effects of Incubating, Rearing, etc.]

68. Include a discussion of predation, competition, and diseases that occur from planting in the No Action alternative. (USFWS)

Response: That discussion exists already in section 3.3.3.2.

Section 3.4.1 Proposed Action and Phased Study [Effects of Hatchery Modifications, Acclimation Site Development and Facilities Operations]

69. It will be very difficult to achieve a locally adapted stock with the adult collection procedures suggested here (WDFW).

Response: The facilities and procedures will be developed as part of the discussion with the Technical Work Group but are expected to be similar to those used by WDFW in its broodstock programs for the mid-Columbia facilities.

70. Is raising fish at the hatchery in Entiat really developing a locally-adapted broodstock? Shouldn't the hatchery used be in the same watershed in which you are trying to establish the broodstock? (NMFS)

Response: Ideally, the fish would be captured, bred and reared in the same water in which they are acclimated and released, because there may be some additional imprinting value. However, rearing them in a nearby basin is preferable to doing so in the lower Columbia because it reduces transportation stress from long fish hauls that might induce disease.

71. Do Entiat and/or Winthrop have room for egg incubation and juvenile rearing? (NMFS)

Response: As explained in the draft EA in section 3.4.1.1, there are plans to increase capacity at Winthrop. Options were included in the EA to allow this project to work around production for other programs.

72. Under the current production program, adults cannot be captured, held, or spawned at Leavenworth NFH. (USFWS)

Response: Leavenworth has been removed as an option for adult holding and spawning. We believe that the dam on the hatchery side channel can be used for adult capture. This use would be fully coordinated with USFWS before implementing.

Section 3.4.1.2 Hatchery Operations [Proposed Action and Phased Study]

73. Will there be any difficulty obtaining additional water rights from DOE? (Roberts)

Response: The amounts of water required, and the fact that the same amount of water is returned to the river as is removed, would suggest that additional water rights, if necessary, would not be difficult to obtain. Temporary water rights for 8 weeks of acclimation operation during high flows have been obtained by the YIN in years past.

74. Suggest that uncontaminated fish carcasses be left in the river to improve the nutrient levels in the streams. (Rieman, Hurley, Washington Trout, USFWS)

Response: The section has been changed to acknowledge that possibility and to identify the impacts and benefits.

75. What would you do with diseased fish carcasses? (Roberts)

Response: The carcasses of adult coho that return and spawn naturally would remain in the streams. Diseased carcasses from the hatchery would be disposed of in a standard approved manner, depending on the hatchery. Diseased carcasses would not be placed in the stream.

76. If coho return to spawn, would there be increased pH levels due to increased algal growth? (Roberts)

Response: We do not expect a significant increase in the level of algal growth or pH due to increased number of fish carcasses because there would not be enough carcasses to create enough nutrient loading to promote algal growth, particularly in a flowing river.

77. Concerned about use of formaldehyde solutions and their effects. (Rieman, USFWS)

Response: Information about how formalin is used in hatcheries has been added to section 3.4.1.2.

Section 3.4.1.3 Development and Use of Acclimation Sites [Proposed Action/Phased Study]

78. Two sites, Swamp Creek and Chiwaukum Creek, are on National Forest land, and White River would require access across National Forest roads. Activities must comply with the Wenatchee National Forest land management documents. Ground disturbing activity would need appropriate, site-specific NEPA analysis including Threatened and Endangered Species surveys, surveys for Survey and Managed species and for cultural resources. (USFS)

Response: These requirements were acknowledged in sections 3.4.1.3 and 4.8 of the draft EA. However, the Chiwaukum Creek site has been dropped as an alternative.

79. The EA does not address the issue of providing proper acclimation sites in any of the various Upper Columbia watersheds. . . . Some investment in thought, time and money should be devoted to constructing or otherwise securing improved acclimation for a safe and healthy rearing area. (WDFW)

Response: Because this proposal addresses research projects only to determine feasibility of coho reintroduction, it would not be cost effective to consider major construction of facilities for the few years of the research. In addition, the goal is to determine if coho can reproduce in the natural environment, so "channels, ditches, off-channel ponds," etc. as the commenter describes them, would more closely replicate the natural rearing conditions that coho might encounter if they were to spawn naturally in suitable habitat nearby. Should a full implementation project be proposed, it might be appropriate to consider more developed acclimation sites as an alternative.

80. How does blocking oxbows and side channels affect fish using them as habitat? (USFWS)

Response: The expected impact to the temporary blockage of a small side channel is expected to be negligible because the total streamside margin occupied by the acclimation site is negligible.

81. How will acclimation facilities be affected by high spring flows? Will the nets/damboards/and outflow pipes be able to handle the high flows? (USFWS)

Response: An assessment of the flood risk of the sites has been added to section 3.4.1.3. Most sites would not be at risk of flooding, and thus prematurely releasing smolts, except during major flood events. Due to the short-term nature of the research proposed, it would not be cost-effective to build flood-proof sites. See also response to comment #79.

82. Using the settling ponds at Leavenworth Hatchery as an acclimation site rather than the side channel fits with Icicle Creek Watershed Council's long-range vision of Icicle Creek being restored to its original productivity. (Rieman)

Response: This proposal to use the pollution abatement pond at Leavenworth Hatchery is made only for 1999, as the pond is not considered suitable rearing habitat (see new discussion in section 3.4.1.3). A weir has been designed but not yet fabricated that would allow rearing of coho to take place in the side channel without blocking passage by other fish. The Tribal Alternative proposes to use the side channel for acclimation in 2000 and 2001.

83. It is difficult to see any basis for requiring an EIS to make such a simple decision as restoring natural fish passage in Icicle Creek. (Washington Trout)

Response: The decision to restore Icicle Creek, and to evaluate the consequences in an EIS, is not BPA's decision. It is the decision of USFWS, the operators of Leavenworth National Fish Hatchery.

84. The EA needs to reference all pertinent State laws such as the fish screening and fish passage requirements, including the ability to remove blockages to fish migration and to charge property owners the costs of corrective action. (Washington Trout)

Response: These laws are not relevant to the decision being evaluated in this EA. See also response to comment #37.

85. Concerned about use of the water in acclimation sites because the Methow and Wenatchee Rivers are on the 303d list for high instream temperatures and water quantities are over-allocated in both watersheds. (USFWS)

Response: Water use in acclimation sites is non-consumptive. For most sites, it would not be withdrawn or pumped from somewhere else but is part of existing, natural ponds, so existing use would not change. The sites would be used for a maximum of two months in spring during high flows, when the water is quite cold, so there would be no effect on water temperature. The discussion in the EA has been made clearer.

86. Will the water diverted through an acclimation pond be cleaned after fish use? (Roberts)

Response: No. As stated in section 3.4.1.3, the biomass increase for each acclimation pond is below the limit requiring treatment.

87. Icicle Creek side channel is/may be within the 100-year floodplain. (USFWS)

Response: We consulted FEMA maps for the draft EA, which show the Leavenworth Hatchery outside of the 100-year floodplain boundary. We understand, however, that the area has flooded, even with the dam.

88. Would the beaver seal up the smolt exit pipe at the Butcher Creek site? (Roberts) Would beaver chew through the nets or get killed crossing the road at Swamp Creek when the culvert is closed off? (USFS)

Response: A beaver might try to seal the pipe, but based on others' experience, it seems more likely that they would try to build the dam higher instead, because they don't understand that the water is going out of the pipe. If necessary, researchers would clean out the pipe. The short time the nets are in place makes it unlikely the beaver would be adversely affected by their presence. We have used the nets before and have not had beavers or otters chew through them.

89. There are some Regional Forester's Sensitive Plants (*Carex interrupta*) in the Swamp Creek area. (USFS)

Response: No impact is expected because ground would not be disturbed at this site.

90. Due to possible impacts on sensitive plants, is it possible not to use the Two Rivers and Chiwaukum Creek sites? If they are not used, would potential for predation require that one or two other sites be chosen? (Roberts)

Response: As stated on p. 46 of the draft EA, those sites would not be used if sensitive plants were found during the site survey and could not be avoided during construction. As stated on p. 9 of the draft EA, a maximum of three sites are needed for this research—not all sites suggested as alternatives would be developed. In addition, the Chiwaukum site has been eliminated as an alternative.

91. Discuss the effects of future runoff from the gravel pit [at the Two Rivers site] through the channel and riparian area. (USFWS)

Response: The site would be designed so runoff from the site would not enter the channel. There are no large hills of gravel or dirt immediately adjacent to the proposed pond site at Two Rivers, and a berm protects the river from the excavation site.

92. The EA is incorrect in stating that a USFS road would be used to access the White River site; it is accessed only by a Chelan County road. (J. May)

Response: In fact, the site would be accessed from a combination of county and USFS roads. Both would have to be plowed. The site is in the Sears Creek area. The main county road would be plowed to the first bridge crossing the White River. From there, a USFS road would be plowed to the pond located in the Sears Creek area.

93. Concerned with plowing the road for the White River site because it would hinder access by private property owners to their homes. (J. May)

Response: We would not affect the existing turnaround where parking and loading is available but would continue plowing the road further up the road to the pond without providing another turnaround or additional parking.

94. Concerned about plowing the Sears Creek road [to the White River site] because of effects on potential spring emergence habitat for grizzly bears. Could a gate be put up to reduce the effect? (USFS)

Response: A gate on the Sears Creek road has been added to the proposal.

95. Why is the White River acclimation site, which would affect wetlands, being pursued when the EA states that the project would not be needed to meet Federal court rulings and when the State of Washington can barely fund its Fish and Wildlife department? (J. May)

Response: As stated in the response to comments #1 and #2, coho reintroduction has been agreed to as a priority activity among fish managers, including Washington Department of Fish and Wildlife, in the Columbia River basin. Current programs are not succeeding in meeting that goal. As stated on page 48 of the draft EA, only nets would be required at the White River site—no ground disturbing activities would occur. Therefore, the wetland environment would not be adversely affected.

96. Several substantial log jams on the White River should be removed. If they break up, they will create havoc on spawning beds. (S. May)

Response: Large woody debris is a critical and functional component to a healthy river ecosystem. We have no plans to alter existing large woody debris in either the Methow or Wenatchee sub-basins, nor is this kind of issue within the scope of this proposal.

97. Consider using the Sears Creek area as an alternative to the White River acclimation site. (J. May)

Response: The proposed site is in the Sears Creek area.

Section 3.5.1 [Effects of Monitoring Activities, Proposed Action and Phased Study]

98. Discuss effects of operating screw traps during high spring flows. (USFWS)

Response: Traps would be secured with cable and cleaned of debris regularly, as stated in the EA. They are expected to withstand high flows.

99. Thoroughly discuss effects on other species of screw traps, electro-fishing, beach seining, and fish measurements. (USFWS)

Response: The proposal to measure other fish besides coho caught in traps or by other methods has been dropped. Species other than coho would be released immediately. That discussion in section 3.5.1 has been changed. The effects of other activities mentioned have been adequately evaluated.

100. Would beach seining lead to overcrowding and possible predation? (Roberts)

Response: Beach seining is a method used to capture juvenile fish. Capture happens within two minutes and fish are immediately removed from the net for analysis, then released immediately after workup. There is no real opportunity for predation in these circumstances.

101. Where are the recovery ponds located for the fish measurement activities? (Roberts)

Response: Fish are initially recovered in a bucket of freshwater and then released into pools that are natural areas of slack water in the stream where the fish are collected. The discussion has been made clearer.

Section 3.6 Cumulative Fishery Resource Impacts

102. How do you know that changes to the physical environment are too minor to have either significant adverse or beneficial effects? (Roberts)

Response: Section 3.6 has been modified to indicate that because only 0.8 hectares (2 acres) of ground would be disturbed for all the potential work required under the most ground-disturbing alternative, the amount is too minor to have significant effects even when combined with other activities known to be taking place in the basin.

Section 3.6.2 Migration Corridor Impacts

103. Migration corridor impacts are not adequately addressed in this proposal. They could be mitigated by matching increases in smolt production from naturalization projects such as this with similar reductions in smolt releases from hatcheries that are not associated with wild fish enhancement, and from stocks that are similar in timing and geographic location. (Hurley)

Response: This reduction is happening to some extent. In the long term, if Phase 2 were implemented and successful, eventually the coho produced in the lower river hatcheries that are released in the mid-Columbia would be replaced with the locally produced and adapted stock. We believe the analysis adequately assesses the impacts for the period of the proposed research.

104. New impacts to fish migrating between the Wenatchee and Methow rivers are not described. (USFWS)

Response: The sentence has been made more specific to indicate that those potential impacts are ecological interactions.

Editorial Changes

105. Suggest specific wording changes on 7 different pages of the draft EA (p. 15 Table 3, p. 16, p. 19, p. 24, p. 30, p. 32, p. 37). Most concern monitoring of predation impacts for the Hatchery Releases alternative. (NMFS)

Response: Changes have been made to accommodate those concerns.

106. Suggest editorial corrections in draft EA to p. 10, p. 45, and p. 48. (USFWS)

Response: Those changes have been made.

General Comments

107. This proposal was not publicized enough to affected citizens and the comment period was too short. (Crampton)

Response: It is always difficult to satisfy everyone in terms of adequate notice and review periods. BPA continues to strive to find satisfactory ways for the public to contribute to actions that interest or affect them while maintaining reasonable decision-making schedules.